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Earl of Moray.

PANTOLOGIA.

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PANTOLOGIA.

HO-NAN, a province of China, bounded on the north by Chan-si and Pe-tche-li, on the east by Kiang-nan and Chan-tong, on the south by Hou-quang, and on the west by Chen-si. The Chinese call it *Tong-hoa*, which signifies the flower of the middle; it contains eight cities of the first rank. The whole province is a plain, except towards the west, where it is mountainous; it is well watered with rivers, great and small; the air is temperate and healthy; it produces corn, rice, and fruit in great abundance and variety. The Hoang crosses it from west to east.

Ho-nan, a city of China, of the first rank, and capital of the province of Ho-nan, supposed formerly by the Chinese to have been the centre of the world, because it is in the centre of their empire; 360 miles SSW. of Peking. Lat. 34. 44 N. Lon. 112. 9 E.

HONDIUS (Abraham), a Dutch painter of landscapes, animals, &c. was born at Rotterdam, in 1638. His manner was peculiarly bold and free, and there is a great deal of fire in his composition. His most capital picture is the burning of Troy, in which there is great variety of figures well designed and disposed with judgment. He died in 1691.

HONDURAS, a province of Mexico, in North America, bounded on the north by a gulf to which it gives name, on the east by the Caribbean Sea, on the south by Nicaragua, and on the west by Guatimala and Vera Paz; 130 leagues from east to west, and fifty from north to south. The country consists of mountains, vallies, and plains, watered by a great number of rivers. It was formerly one of the most populous countries of America; at present, though exceedingly fertile, almost a desert. The soil in many parts bears Indian corn three times a-year, other productions are wheat, peas, cotton, wool, log-wood, with excellent pastures, honey, wax, and provisions of all kinds. Among other vegetables, are large gourds, which the Indians call hibueras, and the first discoverer seeing many of them floating along the coast, called the bay *Golfo de Hibueras*, and the province itself *Hibuera*: yet afterwards finding very deep water at the great cape of this country, they called it *Cabo de Honduras*, that is, *The Promontory of Depth*, and the country itself *Honduras*. The vineyards bear thrice a year; for immediately after the vintage, the vines are cut again, and the second grapes are ripe before Christmas. The ancient inhabitants being extremely slothful, sowed so sparingly, that they were often in want, and forced to feed on roots, and even on vermin and carrion. A great deal of log-wood is cut on the coast of the bay, chiefly by Englishmen: there are said to be 1500 log-wood cutters, masters, besides servants. The bay is situated west of the Caribbean Sea, between Cape Catoche and Cape Honduras. There are several small islands, and formerly there was a considerable pearl fishery, now neglected. The principal towns are Valadolid, the capital, Truxillo, Gracias-a-Dios, and St. Jago.

HONDUROS, a town of the island of Cuba; 68 miles NE. Bayamo.

HONE. *s.* (hæn, Saxon, a stone; hænan, to stone.) A whetstone for a razor (*Tusser*).

To Hone. *v. n.* (honȝian, Saxon.) To pine; to long for any thing.

HONEKEUYA. In botany, a genus of

the class octandria, order monogynia. Calyx five-leaved; petals five; nectaries resembling stamens; capsule, bristly, five-celled, four-valved, with a single seed in each. One species, a native of Guinea, with terminal flowers three together.

HO'NEST. *a.* (*honestus*, Lat.) 1. Upright; true; sincere (*Watts*). 2. Chaste. (*Shak.*) 3. Just; righteous; giving to every man his due (*Tate*).

HO'NESTLY. *ad.* 1. Uprightly; justly (*Ben Jonson*). 2. With chastity; modestly.

HO'NESTY. *s.* (*honestas*, Lat.) Justice; truth; virtue; purity (*Temple*).

The meaning of the word honesty is now, however, more restricted. *Honesty* is the quality of a man, firm and constant in respecting the rights of others, and rendering to himself no more than what he is entitled to, according to the strict rules of justice. *Integrity* is the quality of a man, firm and constant in fulfilling his duty, without the least intermission. *Probity* is the quality of a man firm and constant in the practice of morality, according to the rules impressed by the Deity upon the human heart. *Honesty* requires an upright heart; its principle is love of order and character. *Integrity* requires a pure heart, and a scrupulous conscience; its principle is love of duty. *Probity* requires what is usually termed a heart naturally good; its principle is love of virtue. *Honesty* excludes all injustice; *integrity*, all corruption; *probity*, all evil. *Honesty* is the first virtue of the poor; *integrity*, of the citizen; *probity*, of the great.

HO'NESTY, in Botany. See LUNARIA.

HO'NEY. (*Mel.*) A substance collected by bees from the nectary of flowers, perfectly resembling saccharine juices. It has a white or yellowish colour, a soft and grained consistence, and a saccharine and aromatic smell. Honey is an excellent food, and a softening and slightly aperient medicine: mixed with vinegar, it forms *oxymel*, and is exhibited in various modes in medicine and pharmacy. See APIS, and BEE.

Honey is very soluble in water. By distillation, it affords an acid phlegm and an oil; the residual coal is spongy and porous, like that of the vegetable mucilages. When heated with nitric acid, oxalic acid is extracted, as from sugar. Honey appears to be composed of sugar, mucilage, and an acid: the sugar may be separated by melting the honey, adding carbonat of lime in powder, and scumming the solution while hot; crystals of sugar are gradually deposited on the cooling of the liquor.

HONEY (poisonous), of North America. Dr. Benjamin Smith Barton has published in Tilloch's Philosophical Magazine, Vol. XII. and in the American Transactions, Vol. V, a paper on this subject. It appears that the honey is found in a wild state, by the hunters in South Carolina, Georgia, and the two Floridas, but more particularly East Florida. The plants from which the bees have been observed to extract it, are the kalmia angustifolia and latifolia of Linnéus, the kalmia hirsuta of Walter, the andromeda mariana, and some other species of this genus. The colour of the deleterious honey is not always the same; nor is this a sufficient criterion of its quality. It is experience alone that enables the hunters and others to determine whether the honey they find be poisonous or innocent. They are accustomed, therefore, to eat a small quantity before they venture to satisfy their appetite. Should this produce any disagreeable effects, they do not think it prudent to continue the use of it. But if, in a short time, it occasions no inconvenience, they think they may, with perfect safety, indulge their appetite to the full. The poisonous honey has been observed to produce the following effects: at first, a dimness of sight, or vertigo, succeeded by a delirium, which is sometimes mild and pleasant, and sometimes ferocious; ebriety, pain in the stomach and intestines, convulsions, profuse perspiration, foaming at the mouth, vomiting and purging; and in a few instances, death. In some persons, a vomiting is the first effect of the poison. Sometimes the honey has been observed to produce a temporary palsy of the limbs; an effect which we have remarked in animals that have eaten of one of those very vegetables from whose flowers the bees obtain a pernicious honey. It is, however, very seldom fatal; the disorders it occasions generally working their own cure, either by occasioning vomiting, purging, or profuse perspiration; the two former of which relieve the pain in the intestines, and the latter the fever. The efficacy of medicine in promoting the recovery of persons who have eaten this honey has not been yet ascertained.

Several of the ancient Greek and Roman writers have related instances of the deleterious properties of the honey of certain countries. Diascorides, Pliny, Diodorus Siculus, and Xenophon have mentioned them; but their descriptions of plants, for want of a methodical nomenclature, are frequently so obscure, that it is very difficult, if not impossible, to determine precisely those to which they referred.

The proper management of bees is an object by no means of trifling importance. It is not sufficient that bees merely make honey and wax: their honey may be injurious or poisonous, and their wax may be nearly useless. To assist and direct the labours of these useful insects, the knowledge and the hand of man are required. Let him, says Dr. B. carefully remove from about the habitations of his bees every fetid or poisonous vegetable, however comely its colour or its form. In particular, let him be careful to remove those vegetables which are noxious to himself. In place of these, let him spread the "marjoram and thyme," and other plants, "the love of bees," (*Armstrong*). He may then furnish his table with a honey

not inferior to that of Mount Hermettus, or of Athens; nor to that of Sicily, to which Virgil has so handsomely alluded in the seventh Eclogue:

Nerine Galatea, thymo mihi dulcior Hyblæ,
Candidior cynsis, hederâ formosior alba.

Ho'ney-comb, a waxen structure, full of cells, framed by the bees, to deposit their honey and eggs in. The construction of the honey-comb seems one of the most surprising parts of the works of insects, and the materials of which it is composed, which, though evidently collected from the flowers of plants, yet do not, that we know of, exist in them in that form, has given great cause of speculation to the curious. The regular structure of the comb is also equally wonderful. When the several cells in it are examined, it should seem that the nicest rules of geometry had been consulted for its composition, and all the advantages that could be wished or desired in a thing of that kind, are evidently found in it. Each cell consists of six plane sides, which are all trapeziums, but equal to each other: the bottom of the cell is contrived with three rhombuses, so disposed as to constitute a solid angle under three equal angles, and each of which is double the maximum angle of 54°. 44′. Hence it comes to pass, that a less quantity of surface is sufficient to contain a given quantity of honey, than if the bottom had been flat, in the proportion of 4,658 to 5,550, as has been found by calculation; that is, nearly a fifth of the whole, so far as the figure in the end of the cells extends, in each; which fifth part of wax and labour saved, amounts to a vast deal in the whole comb. And if these admirable insects knew their advantage, they could not more nicely observe the rules of modern geometry.

The method of making two sorts of cells in each comb is also admirably contrived to save the expence of wax, since had they been made single, every comb must have had its peculiar base, and every set of cells their bottom of wax, whereas one bottom now serves for two cells; and there is but one plate of wax in the centre of a double comb. This structure occasions a very great sparing of the wax, or matter of the comb; but, besides this, there is another great advantage resulting from this structure, which is, that the angles arising from the forementioned combination of the bases, greatly strengthen the whole work.

The sides of the cells are all much thinner than the finest paper, and yet they are so strengthened by their disposition, that they are able to resist all the motions of the bee within them, as they are frequently obliged to be. The effect of their thrusting their bodies into the cells, would be the bursting of those cells at the top, were not this well guarded against. But to prevent this, the creatures extend a cord, or roll of wax, round the verge of every cell, in such a manner, that it is scarce possible they should split in that particular part. This cord or roll is at least three times as thick as the sides of the cell, and is even much thicker and stronger at the angles of the cells, than elsewhere, so that the aperture of each cell is not regularly hexagonal, though its inner cavity be perfectly so. The several combs are all placed parallel to one another, and there is such a space left between them, that the bees can easily pass; and often they place a part of the comb in a contrary direction to the rest, so that while the others are placed horizontally, these stand perpendicularly. The cells which have served, or are to serve for the habitation of the worms of the common and of the male bees, are often made also at other times the receptacles of honey; but though these are indifferently made to serve either use, there are others destined only to receive honey. The celerity with which a swarm of bees, received into a hive where they find themselves lodged to their minds, bring their works of the combs to perfection, is amazing. There are vast numbers at work all at once; and that they may not incommode one another, they do not work upon the first comb till it is finished, but when the foundation of that is laid, they go to work upon another, so that there are often the beginnings of three or four stories made at once, and so many swarms allotted to the carrying on the work of each.

To Ho'ney. *v. n.* (from the noun.) To talk fondly (*Shakspeare*).

Honey-cup. In botany, nectarium, or nectary. Honey-cup is improper, because few nectaries are in form of a cup; not more so, however, than glass ink-horn, silver terrene, Dresden China, and many other barbarisms. But why multiply these unnecessarily? See Nectarium.

Honey-dew, or *Suffusio mellita*, a sweet substance found on the leaves of oak, hazle-nut, hops, and other plants; and which has been erroneously supposed to fall from the sky.

According to Dr. Darwin, the honey-dew is a saccharine juice that exudes from trees, in consequence of the retrograde motions of the cutaneous lymphatic vessels connected with the umbilical, or with the common sap-vessels of plants; instead of being carried forward to increase the growth of the present leaf-buds, or to accumulate nutriment for the buds, which are in an embryon state.

This exudation is consequently very injurious to the trees which are subject to it; especially from its great sweetness, which attracts immense numbers of bees and ants; no method of preventing it has hitherto been discovered.

Honey-flower, in botany. See Melianthus.

Honey-guide. See Cuculus.

Honey-locust. See Gleditsia.

Honey-moon. The first month after marriage (*Addison*).

Honey-stone. See Mellites.

Honey-suckle. See Lonicera.

Honey-suckle, African fly. See Halleria.

Honey-suckle, (American, upright.) See Azalea.

Honey-suckle, (Fr.) See Hedysarum.

Honey-wort. See Cerinthe.

HO'NEYLESS. *a.* Being without honey (*Shakspeare*).

HO'NIED. *a.* (from *honey.*) 1. Covered with honey (*Milton*). 2. Sweet; luscious (*Shakspeare*).

HONFLEUR, a considerable sea-port of France, in the department of Calvados. The harbour, which is very capacious, is at the mouth of the Seine. Lat. 49. 24. N. Lon. 0. 15. E.

HONI SOIT QUI MAL Y PENSE, q. d. "Evil to him that thinks evil;" the motto of the most noble order of the Knights of the Garter. See Garter.

HONITON, a borough of Devonshire, with a market on Saturday. A dreadful fire happened there in July 1747, which consumed three parts of the town, and the damage was computed at 43,000l. It has one church, half a mile from the town, and a chapel within it. Here is a large manufactory of bonelace. Just before the entrance into the town, from London, is a hill, which commands one of the most beautiful prospects in the kingdom. Honiton is seated on the river Otter. Lat. 50. 45. N. Lon. 3. 12. W.

HONORIACI, an order of soldiery under the Eastern empire, who introduced the Goths, Vandals, &c. into Spain, when, in fact, they were appointed to prevent their entrance.

HO'NORARY. *a.* (*honorarius*, Lat.) 1. Done in honour; made in honour (*Addison*). 2. Conferring honour without gain. (*Add.*)

HO'NOUR. *s.* (*honeur*, Fr. *honor*, Lat.) 1. Dignity; high rank. 2. Reputation; fame (*Bacon*). 3. The title of a man of rank (*Shakspeare*). 4. Subject of praise (*Shakspeare*). 5. Nobleness of mind; magnanimity (*Rogers*). 6. Reverence; due veneration (*Shakspeare*). 7. Chastity (*Shakspeare*). 8. Dignity of mien (*Milton*). 9. Glory; boast (*Burnet*). 10. Public mark of respect (*Wake*). 11. Privileges of rank or birth (*Shakspeare*). 12. Civilities paid (*Pope*). 13. Ornament; decoration (*Dryden*).

Honour and Virtue were deified among the ancient Greeks and Romans, and had a joint temple consecrated to them at Rome; but afterwards each of them had separate temples, which were so placed, that no one could enter the temple of Honour without passing through that of Virtue; by which the Romans were continually put in mind, that virtue is the only direct path to true glory. Plutarch tells us, that the Romans, contrary to their usual custom, sacrificed to Honour uncovered; perhaps to denote, that, wherever honour is, it wants no covering, but shows itself openly to the world.

Historians have furnished us with some striking instances of honour, with regard to truth, humanity, &c. which have been observed in different ages and countries. We select a remarkable one of a poor unenlightened African negro, recorded in Captain Snelgrave's account of his voyage to Guinea. A New England sloop, trading there in 1752, left a second mate, William Murray, sick on shore, and sailed without him. Murray was at the house of a black named Cudjoe, with whom he had contracted an acquaintance during their trade. He recovered; and the sloop being gone, he continued with his black friend till some other opportunity should offer for his getting home. In the mean time, a Dutch ship came into the road, and some of the blacks coming on board her, were treacherously seized and carried off as their slaves. The relations and friends, transported with sudden rage, ran to the house of Cudjoe, to take revenge by killing Murray. Cudjoe stopped them at the door, and demanded what they wanted. "The white men," said they, "have carried away our brothers and sons, and we will kill all white men. Give us the white man you have in your house, for we will kill him." "Nay," said Cudjoe, "the white men that carried away your relations are bad men, kill them when you can take them; but this white man is a good man, and you must not kill him."—"But he is a white man," they cried, "and the white men are all bad men, we will kill them all." "Nay," says he, "you must not kill a man that has done no harm, only for being white. This man is my friend, my house is his post, I am his soldier, and must fight for him; you must kill me before you can kill him. What good man will ever come again under my roof, if I let my floor be stained with a good man's blood?" The negroes seeing his resolution, and being convinced by his discourse that they were wrong, went away ashamed. In a few days Murray ventured abroad again with his friend Cudjoe, when several of them took him by the hand, and told him, "They were glad they had not killed him; for, as he was a good (meaning innocent) man, their God would have been very angry, and would have spoiled their fishing."

Honour, in the *beau monde*, has a meaning which it is easier to illustrate than define. It is, however, subject to a system of rules, called the law of honour, constructed by people of fashion, calculated to facilitate their intercourse with one another, and for no other purpose. Consequently nothing is considered as inconsistent with honour but what tends to incommode this intercourse. Hence, as Archdeacon Paley states the matter, profaneness, neglect of public worship or private devotion, cruelty to servants, rigorous treatment of tenants or other dependants, want of charity to the poor, injuries done to tradesmen by insolvency or delay of payment, with numberless examples

of the same kind, are accounted no breaches of honour; because a man is not a less agreeable companion for these vices, nor the worst to deal with in those concerns which are usually transacted between one gentleman and another.

If this, however, be honour, we may say, in the language of Shakspeare,

——— "The mere word's a slave,
"Debauch'd on ev'ry tomb; on ev'ry grave
"A lying trophy; and as oft is dumb,
"Where dust and damn'd oblivion is the tomb
"Of honour'd bones indeed."

Honours of War, in a siege: when a governor, having made a long and vigorous defence, is at last obliged to surrender the place to the enemy for want of men and provisions, and makes it one of his principal articles to march out with the honours of war; that is, with shouldered arms, drums beating, colours flying, and all their baggage, &c.

Honours, (Military). All armies salute crowned heads in the most respectful manner, drums beating a march, colours and standards dropping, and officers saluting. Their guards pay no compliment, except to the princes of the blood; and even that by courtesy, in the absence of the crowned head. To the commander in chief the whole line turns out without arms, and the camp-guards beat a march, and salute. To generals of horse and foot, they beat a march, and salute. Lieutenant-generals of ditto, three ruffs, and salute. Major-generals of ditto, two ruffs and salute. Brigadiers of ditto, rested arms, one ruff, and salute. Colonels of ditto, rested arms, and no beating. Sentinels rest their arms to all field-officers, and shoulder to every officer. All governors, that are not general officers, shall, in all places where they are governors, have one ruff, with rested arms; but for those who have no commission as governors, no drum shall beat. Lieutenant-governors shall have the main-guard turned out to them with shouldered arms. Thus much in the general; the minutiæ we cannot specify.

Honour, (Fountain of). The king is so styled, as being the source of honours, dignities, &c. See Prerogative. Although the origin of all sovereignty is in the people, yet it is absolutely impossible that government can be maintained without a due subordination of rank. The British Constitution has therefore entrusted the king with the sole power of conferring dignities and honours, in confidence that he will bestow them only upon such as deserve them. Hence it is that all degrees of nobility, of knighthood, and other titles, are received by immediate grant from the crown: either expressed in writing, by writs or letters patent, as in the creation of peers and baronets; or by corporeal investiture, as in the creation of a simple knight.

Honour (Maids of), are young ladies in the queen's household, whose office is to attend her majesty when she goes abroad, &c. In England they are six in number, and their salary 300l. per annum each.

Honour is particularly applied in our customs to the more noble kind of seignories or lordships, whereof other inferior lordships or manors hold or depend. As a manor consists of several tenements, services, customs, &c. so an honour contains divers manors, knights-fees, &c. It was also formerly called *beneficium* or *royal fee*, being always held of the king *in capite*.

Ho'nour-point, in heraldry, is that next above the centre of the escutcheon, dividing the upper part into two equal portions.

To Ho'nour. *v. a.* (*honoro*, Lat.) 1. To reverence; to regard with veneration (*Pope*). 2. To dignify; to raise to greatness. (*Exod.*) 3. To glorify (*Exodus*).

HO'NOURABLE. *a.* (*honorable*, French.) 1. Illustrious; noble (*Isaiah*). 2. Great; magnanimous; generous (*Shakspeare*). 3. Conferring honour (*Dryden*). 4. Accompanied with tokens of honour. (*Sp.*) 5. Not to be disgraced (*Shakspeare*). 6. Free from taint, or reproach (*Maccabees*). 7. Honest; without intention of deceit (*Hay*). 8. Equitable.

Members of the King's privy council are styled *Right Honourable.*

HO'NOURABLENESS. *s.* (from *honourable.*) Eminence; magnificence; generosity.

HO'NOURABLY. *ad.* (from *honourable.*) 1. With tokens of honour (*Shakspeare*). 2. Magnanimously; generously (*Bacon*). 3. Reputably; with exemption from reproach (*Dryden*).

HO'NOURER. *s.* (from *honour.*) One that honours; one that regards with veneration.

HOOD, in composition, is derived from the Saxon had, in German *heit*, in Dutch *heid*. It denotes quality; character; condition: as, *knighthood; childhood; fatherhood*. Sometimes it is written after the Dutch, as *maidenhead*. Sometimes it is taken collectively: as, *brotherhood*, a confraternity.

Hood. *s.* (hod, Saxon.) 1. The upper covering of a woman's head. 2. Any thing drawn upon the head, and wrapping round it (*Wotton*). 3. A covering put over the hawk's eyes. 4. An ornamental fold that hangs down the back of a graduate, to mark his degree.

To Hood. *v. a.* (from the noun.) 1. To dress in a hood (*Pope*). 2. To blind, as with a hood (*Shakspeare*). 3. To cover. (*Dryd.*)

Hood *Island*, one of the Marquesas.

HOODED willow herb. See Scutellaria.

Hooded, in botany. See Cowled.

HO'ODMAN (Blind). *s.* A play in which the person hooded is to catch another, and tell the name; blindman's buff (*Shakspeare*).

To HOOD-WINK. *v. a.* (*hood* and *wink.*) 1. To blind with something bound over the eyes. (*Sid. Dav.*) 2. To cover; to hide. (*Shak.*) 3. To deceive; to impose upon (*Sidney*).

HOOF. *s.* (hof, Saxon; *haf*, Dutch.) The hard horny substance on the feet of graminivorous animals (*More*).

HOOF of a horse or other quadruped, the hard horny substance at the lower extremity of the legs, coming into contact with the ground, and upon which are often placed shoes, made of iron, for the preservation of the feet. The hoof of a horse, to be perfect, should nearly circumscribe five eighths of a circle, with a transverse line from one point of the heel to the other, as if a segment of three-eighths was taken away; in addition to which form, it should be solid in substance, smooth to the hand, and free from contracted rings, or wrinkles, like those found upon the horns of cattle, by which their age is ascertained.

The horse's foot is made up of a great variety of parts; some of them possessing blood-vessels and nerves, like other parts of the body, and highly sensible; others are composed of dead horny substance, that is perfectly destitute of feeling. All the external parts of the foot, which, when taken together, are termed the COFFIN, or HOOF, are composed of this horny substance, which is not only very hard, but is possessed also of a considerable degree of toughness and elasticity, which render it extremely durable, and well calculated to protect the sensible parts which it encloses—a purpose for which it was obviously designed by nature.

The hoof consists of the *wall* or *crust*, the *sole*, the *frog*, and the *bars;* the upper part of the crust, where it is connected with the skin, is termed the *coronet*, the lower part in front the *toe;* the sides of the crust are named the *quarters*, the quarters terminate in the *heels*, and the heels are connected with the *frog*. The crust grows from the coronet; and, instead of taking a perpendicular direction, becomes oblique in its descent, whereby it acquires a conical figure, being considerably wider at the basis than at the coronet. But this description of the hoof applies only to the healthy foot, that has not been improperly treated; for, when the bars have been cut away, and the frog mutilated and prevented from receiving pressure, the heels will contract, or approach each other, and the shape of the foot will be considerably altered.

When we examine a hoof that has been recently separated from the foot, an immense number of small orifices, or pores, may be observed in that groove which is found on the inside of the coronet; into these orifices the extremities of those vessels are inserted which secrete the horny matter, the whole of which appears to be pervaded by a fine fluid, serving to prevent brittleness, and to preserve in the hoof a proper degree of elasticity. All the internal surface of the crust, except the groove we have just mentioned, is covered by a beautiful membraneous or laminated substance, which very much resembles the under surface of a mushroom. These are united, or rather interwoven, with similar laminæ or membranes which cover all the anterior and lateral substances of the sensible foot, forming a very secure union between the crust and the internal parts: nor are these membranes possessed merely of great strength; they possess likewise a considerable degree of elasticity, constituting one of those curious springs which Nature has provided to prevent concussion when the animal is in motion. That these laminæ form an union between the crust and sensible foot, of sufficient strength to support the animal's weight, has been proved beyond a doubt, by removing from a living horse the bottom of the hoof, that is, the sole and frog: in this case, had the laminæ been unable to support the horse's weight, the internal foot must have slipped through the hoof, so as to come down upon the ground; but this did not happen, and the sole, as it was reproduced, assumed its proper concave form.

As these laminæ form so secure an union between the crust and the internal foot, it is evident that the weight of the horse is in great measure supported by the crust, which therefore ought to possess considerable strength; for, if it were too weak and flexible, it would not be adequate to the burthen which it has to sustain, and must consequently bend to it. In this case, the hoof would lose that oblique form which it had originally, and would approach the horizontal line; at the same time, the sole would lose its concave form, from receiving an unusual degree of pressure, becoming flat, and at length convex or projecting. But, when the crust is sufficiently strong, the internal foot, and consequently the whole animal, is suspended by those elastic membranes, as a carriage is by its springs; and, though the bottom of the internal foot is in contact with the sole, it nevertheless does not press upon it considerably, except when the horse is in motion, and then the back part of the sole descends a little (being somewhat elastic), and suffers the laminæ to elongate in a small degree, so as to prevent any painful concussion.

That portion of the hoof which comes in contact with the ground is formed by the sole, the frog, and the bars. On these Mr. White makes the following observations:

The sole is rather concave, or hollow, on its external surface, and consists of a different kind of horn from that which forms the crust, being of a scaly texture, and sometimes soft and pulverable, on its exterior surface. Its use is to defend the sensible sole, that lies immediately under it. From its concave form, the horse is enabled to tread more firmly on the ground, and the sensible parts are less exposed to blows or pressure than they would be, had it been made either flat or convex; and, being some-

what flexible and elastic towards the heels, it assists in the action of those curious springs we have just described.

The bars form two ridges, one on each side the frog, extending from the heel of the crust towards the toe of the frog. They appear to be a continuation of the crust, being, like it, composed of strong longitudinal fibres. At the part where it joins the crust, a very firm bearing is afforded for the heel of the shoe. The use of the bars is to oppose any disposition there may be in the hoof to contract, by acting as props to the heels: but, in the common practice of shoeing, they are generally destroyed, for farriers have supposed that they bind the heels together, and prevent their expansion—they have therefore named them *binders*, and cut them away, in order to *open the heels*, as they term it.

The internal foot is endued with great sensibility; and so nicely adapted to the coffin, or hoof, that it completely fills it, without suffering the least inconvenience from pressure; but when the foot has been improperly treated, when the frog has been mutilated, the bars destroyed, and shoes applied that are either turned up or made very thick at the heels, the hoof must necessarily contract, and its cavity become diminished; so that the nerves and blood-vessels being compressed, the circulation of the blood is impeded, and lameness will naturally follow.

All the anterior and lateral surfaces of the sensible foot are covered with that membranous or laminated substance which we have before described; but it differs from those laminæ which are found on the internal surface of the crust, in possessing numerous blood-vessels. At the upper part of the sensible foot, where the laminæ terminate, a roundish projecting body may be observed, extending all round the coronet to the back part of the frog; this is termed the *coronary ring*: its surface is covered with the extremities of blood-vessels, and it is from this part that the hoof is formed.

The natural frog of the horse, says Mr. Coleman, is placed in the centre of the sole, externally convex, and of a wedge-like form, pointed towards the toe, but expanded as it advances to the heels. In the centre of the broad part there is a fissure, or separation. The frog is connected internally with another frog, of a similar figure, but different in structure. The external frog is composed of soft elastic horn, and totally insensible. The internal frog has sensation, and is much more elastic than the horny frog; and at the extremity of the heels is connected with two elastic substances called cartilages. The toe of the sensible frog is united to the coffin-bone; but more than nine-tenths of both frogs are behind the coffin-bone. The toe of the sensible and horny frogs, from their connection with the coffin-bone, are fixed points, and have no motion; but the heels of the frogs being placed posterior to the coffin-bone, and in contact with moveable, elastic, and not fixed or resisting substances, a very considerable lever is formed; and whenever the horny frog comes in contact with the ground, it first ascends, and then descends. The pressure of the ground also expands the horny frog, and the sensible frog expands the cartilages, and at the heels and quarters, immediately below the hair, totally governs the direction of the future growth of the crust.

This ascent of the frog not only, by its wedge-like form, preserves the heels and quarters from contraction, but affords to the horse an elastic spring, and prevents the animal from slipping whenever it embraces the ground. Without any anatomical inquiry into its internal structure and union with other parts, the shape and convexity of the horny frog clearly demonstrates that it was formed to come into contact with the ground; and the more I investigate this subject, the more I am convinced that the use of the frog is to prevent the horse from slipping, to preserve the cartilages and hoof expanded, and, by its motion, to act as an elastic spring to the animal.

Mr. Coleman contends, that Mr. St. Bel, and many others, who suppose that the use of the frog is merely *to serve as a cushion*, or guard, to the tendon of the flexor muscle of the foot, and who, on that account, were disposed rather to *raise the frog from the ground* by a *thick-heeled* shoe, have been in an error. On the contrary, he maintains it to be a law of nature, that, unless the frog perform its functions, by being allowed to press the ground, it must become diseased. Accordingly, the practice of shoeing depends very much on the functions of the frog being understood.

If the opinions here advanced respecting its uses be well founded, then it must follow, that paring the frog, and raising it from the ground, annihilates its functions, and ultimately, if not immediately, produces disease; and that exposing the frog to pressure is the only proper method to keep it in health. Moreover, it has from experience been ascertained, that, unless the frog sustain an uniform pressure when at rest, the heels as well as the frog contract, but if that organ be in close contact with the ground, then it spreads and is free from thrushes and canker, and operates as a wedge to keep open the heels of the hoof.

Granite and other hard substances give no pain to a frog exposed to constant pressure in the stable; but, when above the pavement, it generally becomes contracted, and the sensible frog inflamed, and then one stroke from a projecting stone will produce pain, perhaps lameness, while perpetual perpendicular pressure is attended with salutary effects.

"When the hoof contracts, the frog must also become contracted, and inflammation

and a suppuration follows, called a *thrush*. No contraction, however, takes place where the frog is made to receive constant pressure, as the standing perpetually on that wedge increases its growth, presses upward the sensible frog, and expands the cartilages of the hoof. And as the first shoot of the crust at the coronet is very thin, the direction of its fibres will be altogether regulated by the width of the cartilages immediately below the hair at the quarters and heels, and the cartilages will be always more or less expanded, and the hoof more or less circular, as the frog has more or less pressure.

On that principle, continues Mr. Coleman, I long since recommended a shoe with *thin heels* as the best formed shoe to bring the frog on the same level; and with great truth I can assert, that, although in some instances, from a sudden misapplication of the thin-heeled shoe to improper feet, I have seen the tendons affected, yet, from all the experience I have since had, and from what I have seen or heard of the practice of others, I know of no instance where the frog, from constant pressure, did not expand and receive great benefit.

Where the frog is in a morbid state, and unnaturally deprived of a perpendicular pressure, it is seldom safe to lower the heels at once, so as to make the frog on a level with the shoe; and, in many cases, it is not possible with any shoes, or even without shoes, to give the frog pressure on smooth surfaces; much less is it practicable for the frog to rest on the ground when shod with common thick-heeled shoes. In the stable, therefore, while at rest, the frog is generally raised above the shoe; and as pressure is essential to its health, particularly when the hoof is exposed to heat, it appeared to me of great importance, in all cases where the heels of the shoe and the frog cannot with safety be made on the same level, to apply an artificial frog (see Plate IX.), to fit and give any degree of pressure, in the stable, to the natural frog, with any shoes. While the horse is in motion, and the hoof exposed to unequal surfaces, the artificial frog should be removed, as the natural frog, out of the stable, will receive frequent pressure with any shoes; but that period is of short duration, when compared to the length of time the horse remains at rest, and the frog raised from the ground.

Artificial pressure is most particularly wanted when the heat of the stable operates powerfully to contract the hoof. In all cases, therefore, where the pavement of the stable does not touch the natural frog, an artificial frog is necessary to resist contraction of the hoof, thrushes, and canker. Sand-cracks, also, very generally arise from a contracted hoof, and may be prevented by the artificial frog.

If the frog does not absolutely rest on the pavement, whatever shoes are employed, the hoof in the stable will be as much disposed to contract as if the frog was raised any greater distance. I wish this fact to be well considered; for it has been supposed that shoes with a flat seat, without pressure to the frog, will prevent contraction. But I am fully convinced, that neither thick nor thin heeled shoes, where the frog is raised above pressure, and exposed to the heat of the stable, can prevent contraction or its effects; and, where the frog receives that pressure, the heels cannot contract even with the most common shoes. For very obvious mechanical reasons, a wedge in the centre of the heels, aided by the pressure from below, must be best calculated to preserve them expanded, or, when the heels are contracted, to force them open. The heat of the stable in all cases tends to contraction of the hoof; but, with common shoes, there is no pressure on the wedge, or other cause to counteract that tendency. The artificial frog, which is intended to cover and give any degree of pressure to the natural frog only, is made of iron. In order to fit the natural frog, it is requisite to ascertain its width, the length of the foot, and the distance between the lower surface of the shoe and the frog. But if the artificial frog be too long, the toe, which is flat and thin, may be shortened; and if the heels of the shoe are higher than the artificial frog, nothing more is requisite than to introduce a quantity of tow between the natural and artificial frog, so as to raise it equal or above the level of the shoe. I have ascertained by experience, that no inconvenience takes place by raising the artificial frog even one quarter of an inch above the shoe; but, in ordinary cases, it should not project more than one-sixth of an inch above the surface of the shoe. It may, however, be imagined, that so much perpendicular pressure to the frog would retard rather than increase its growth: but the very reverse is the fact; for, as the frog, when long elevated above the ground, is very generally contracted, this unnatural lateral pressure excites inflammation of the sensible frog, and deprives, in a great degree, the blood-vessels of the power of secreting horn. When the horny frog is exposed to perpendicular pressure, it gives health and not disease, to the sensible frog. The blood-vessels secrete their due proportion of elastic horn, and then the cavity of the frog is preserved, expanded, and fully equal to contain the sensible frog, without the smallest degree of lateral pressure.

It therefore follows, that perpendicular pressure increases the bulk of the frog; while its absence from the ground produces contraction, and lessens its growth.

The following is an explanation of Plate lxxix. in which Mr. Coleman's PATENT ARTIFICIAL FROG is represented, with other figures that illustrate the subject.

Fig. 1. exhibits a view of the natural hoof of the horse, which is of a circular shape.

a a a The external surface of the sole, of a concave form.

b b b The inferior edge of the crust.

c c The junction of the bars with the crust.

d d The points of the bars.

e e The sole between the heels of the crust and bars, the seat of corns.

f f Two cavities between the sides of the bars and the sides of the crust.

g The toe of the frog.

h h The heels of the frog.

i i The cleft between the heels of the frog, the seat of thrushes.

Fig. 2. A view of the hoof with contracted heels, occasioned by raising the frog above the pressure of the pavement in the stable.

a a a The sole.

b b The original seat of the bars, but improperly removed by the farrier.

c c The original seat of the cavities between the bars and crust, but now, from contraction, become solid horn.

d d The heels of the frog very much compressed by the contraction of the hoof.

e e The width of the hoof at the heel, not being more than one half of the length from *f* to *g*.

f The extremity of the heels of the frog.

g The toe of the crust.

Fig. 3. The patent frog, made of cast and wrought iron.

a a The lower surface opposite the ground, formed of cast iron.

b An irregular cavity for the reception of the elastic spring, fig. 4.

c The toe of the patent frog, formed of wrought iron, to be occasionally shortened and adapted to the length of the foot, and placed under the toe of the shoe, to confine the artificial frog from moving forwards.

d d A hole in the heels of the iron frog, for the passage of a strap to buckle at the outside quarter or coronet.

Fig. 4. A flat steel spring to fix the artificial frog in its place.

a An irregular projection, to be received into a corresponding concavity in the patent frog.

b b The ends of the spring, to be placed under the heels of the shoe opposite *e e* in fig. 1.

The toe of the artificial frog is intended to be inserted under the toe of the shoe. This effectually fixes the frog forwards; and to prevent backward or lateral motion, an irregular groove is made in the iron frog, to receive a corresponding piece of steel, placed under the heels of the shoe. In general, it is necessary to fix the frog more firmly; and, for that purpose, a hole is necessary, made in the heel of the artificial frog, to receive a strap, and to buckle at the outside quarter below the coronet. And that the artificial frog may give pressure in all cases, with shoes thickened, or turned up for hunting or frost, a variety of frogs are made, to be adapted to particular feet and particular shoes. In cases of thrushes and canker of the frog, where no remedies without pressure are likely to be serviceable, an astringent thrush-powder may be applied between the natural and artificial frog. And in contracted hoofs (or what has improperly been termed chest-foundered), where it may not be advisable to lower the heels equal with the horny frog, the artificial frog is essentially necessary. But, indeed, in every horse where the shoe and frog on a smooth surface are not on the same level, whatever shoes may be used, the iron frog in the stable should be applied; and, in order to fix it with facility, the spring should first be laced under the shoe, and brought backward to the heels of the hoof.

The toe of the iron frog should then be inserted under the centre of the spring, and pushed as far as the toe of the shoe, while the other hand confines the spring until the centre of the spring meets the centre of the groove. The strap may then be buckled: and, to dislodge the spring and iron frog, after the strap is unbuckled, nothing more is requisite than a small horse-picker introduced into a hole at the bottom of the groove of the iron frog; and the spring being raised above the groove, and carried gently forward, the frog may be withdrawn from under the shoe without the smallest difficulty.

Mr. Coleman, in conclusion, wishes it to be clearly understood, that, in all cases where the frog and the heels of the shoe are placed on the same level, the patent frog is unnecessary. But where the frog is small, or the pastern joint long, or the action of the animal high, or the heels low, so as to render the application of thin-heeled shoes improper, or when the frog, from any cause, is raised above the ground in the stable, an artificial frog is useful in all such cases, and necessary to resist contraction of the hoof.

To this equally ingenious and candid statement of Mr. Coleman, we are enabled to add our individual testimony as to the soundness of his reasoning, and the great practical utility of his *artificial frog*, which is now very generally adopted in the stables of persons of fashion in the United Kingdom, and may be had, at the small price of three shillings, at the Veterinary College, Little Moorfields, as also at a variety of other forges.

Hoof, in geometry (or *ungula*), is a part cut off a cylinder cone, &c. by a plane passing both through the base and part of the curve surface. It has obtained its name from its resemblance to the hoof (*ungula*) of a horse. For the contents and surfaces of such hoofs, see Hutton's Mensuration, page 218—246, 2d Ed. — With respect to the surfaces of conical ungulas formed by planes perpendicular to the base, Father Guido-Grandi first remarked, that if a polygon be inscribed in the base of a cone, and if on

each side of this polygon a plane be raised perpendicular to the base, the portion of the conical surface cut off towards the axis, is equal to a rectilineal space. The portions also of the cone cut off by the above planes, towards the base, are in the same ratio with the segments of the base on which they stand. In fact, whatever figure be inscribed in the base, if we conceive a right prismatic surface raised from the perimeter of the figure, it will cut off from the conical surface a portion which will be to it in the same ratio, namely, that of the radius of the base to the slant height of the cone.

HOOFED. *a.* (from *hoof.*) Furnished with hoofs. (*Greeds*).

Hoofed or Hoof-shaped. In botany, ungulate. Exemplified in the silicle of the Rose of Jericho.

Hoof-bound, in veterinary language, implies a defect in a horse's hoof, in which it becomes so tight round the instep as to turn the foot somewhat into the shape of a bell. As the disease commonly proceeds from hard and undue exercise on rough road, the remedy is best obtained by turning the animal to grass.

Hoof-casting, in veterinary language, a complete separation of a horse's hoof. This may be produced by any cause exciting a general inflammation and abscess in the foot. If the coffin-bone remain uninjured a new hoof will commonly succeed: but the old should never be taken away forcibly, and a soft easy leathern boot or shoe should afterward be applied, interlined with emollient ointment, and the dressing be renewed daily.

HOOGEVEEN (Henry), a learned Dutchman, born at Leyden, of poor parents, in 1712. He received a good education, and at the age of fifteen became a teacher himself for the purpose of supporting his parents. In 1732, he was made under-master of the academy at Gorcum, and shortly after he was appointed to the care of the academy at Woerden, from whence, in 1738, he removed to Culembourg. In 1745 he settled at Breda, which he left in 1761 for Dort, but after a residence of three years there he went and settled at Delft, where he died in 1794. His works are, 1. An edition of Vigerus de Idiotismis Linguæ Græcæ; 2. Doctrina particularum Linguæ Græcæ, 2 vols. 4to. 3. Some Latin poems and Discourses. A posthumous piece of his, entituled, Dictionarium Analogicum Græcum, is now printing.

HOOGLY, a small but ancient city of Hindustan, in Bengal. It is now nearly in ruins, but possesses many vestiges of former greatness. In the beginning of the 18th century, it was the great mart of the export trade from Bengal to Europe. Lat. 32. 30. N. Lon. 88. 28. E.

Hoogly River, an arm of the Ganges, formed by the union of its two western branches, named the Cassium Buzar and Yellinghy rivers. It is the port of Calcutta, and the only branch of the Ganges that is commonly navigated by ships.

HOOK. *s.* (hoce, Saxon.) 1. Any thing bent so as to catch hold. 2. The curvated wire on which the bait is hung for fishes, and with which the fish is pierced. See Angling. 3. A snare; a trap (*Shakspeare.*) 4. An iron to seize the meat in the caldron (*Spenser*). 5. A sickle to reap corn (*Mortimer*). 6. Any instrument to cut or lop with (*Pope*). 7. The part of the hinge fixed to the post. 8. Hook. (In husbandry.) A field sown two years running (*Ainsworth*). 9. Hook *or Crook.* One way or other; by any expedient (*Hudibras*).

Hooks of a ship, those forked timbers which are placed directly under the keel.

Hooks (Can), those which being made fast to the end of a rope with a noose (like that which brewers use to sling or carry their barrels on), are made use of for slings.

Hooks (Foot), in a ship, the same with Futtocks.

Hooks (Loof), a tackle with two hooks; one to hitch into a cringle of the main or fore-sail, in the bolt-rope at the leech of the sail by the clew; and the other is to hitch into a strap, which is spliced to the chess-tree.

Hook-pins, in architecture, are taper iron pins, only with a hook-head, to pin the frame of a roof or floor together.

Hooks (Sheer), in a ship, those hooks like sickles fixed in the ends of the yard-arms, that if a ship under sail come to board her, those sheers may cut her shrowds, and so spoil her tackling.

To HOOK. *v. a.* (from the noun.) 1. To catch with a hook (*Addison*). 2. To entrap; to ensnare. 3. To draw as with a hook (*Shakspeare*). 4. To fasten as with a hook. 5. To draw by force or artifice (*Norris*).

HOOKAH, among the Arabs and other nations of the East, is a pipe of a singular and complicated construction, through which tobacco is smoked. The Hindu's tobacco is made up into a paste with spices: the tobacco being lighted, is put on the upper extremity of a tube, and the lower extremity runs down into a shell or other vessel containing cold water, sometimes rose water; through which the smoke is agreeably drawn by means of another flexible tube, which is the pipe, and about 12 feet long.

HOOKE (Robert), a celebrated mathematician, was born in the Isle of Wight, in 1635; and having a taste for drawing, was placed under Sir Peter Lely: but the oil-colours disordering his head he soon quitted painting, and was taken by Dr. Busby into his house and under his tuition. There he gained a good knowledge of the languages, and about 1653 went to Christ Church, Oxford, and became a member of the Philosophical Society then instituted in that university. He assisted Dr. Willis in his chymical operations, and afterwards became assistant

to Mr. Boyle. He was one of the first fellows of the Royal Society, the repository of which was entrusted to his care. In 1664 he was made professor of mechanics to that learned body with a salary of 50l. per annum, to which was afterwards added 30l. more. At the same time he was elected professor of geometry in Gresham College. After the fire of London he produced a plan of his own for rebuilding the city, which procured him the appointment of one of the city surveyors, though his plan was not carried into effect. In 1668 he had a dispute with Hevelius respecting telescopic sights, which he managed with such warmth as to give great offence to his scientific friends. In 1671 he attacked Sir Isaac Newton's Theory of Light and Colours; and when that philosopher's Principia came out, Hooke pretended that the discovery concerning the force and action of gravity was his own, which occasioned that patient man to feel some just resentment against him. In 1691 archbishop Tillotson created him M. D. by warrant. He died at his lodgings at Gresham College in 1702. He wrote a valuable work, entituled, Micrographia, or Philosophical Descriptions of minute Bodies made by magnifying Glasses, with observations and Inquiries thereupon, folio, 1665. Several of his papers are in the Philosophical Transactions, and after his death appeared his posthumous works, in folio, 1705. He was a man of great mechanical genius, and the sciences are indebted to him for several valuable instruments and improvements. The following are the inventions and discoveries to which he laid claim:

1656, Barometer, a weather glass.

1657, A scapement, for maintaining the vibration of a pendulum.—And not long after, the regulating or balance-spring for watches.

1658, The double-barrelled air-pump.—The conical pendulum.—His first employment of the conical pendulum was no less ingenious and scientific than it was original. He employed it to represent the mutual gravitation of the planets; a fact which he had most systematically announced. He had shewn, that a force, perfectly analogous to gravity on this earth, operated on the surface of the moon and of Jupiter. Considering the numerous round pits on the surface of the moon, surrounded with a sort of wall, and having a little eminence in the middle, as the production of volcanoes, he inferred, that the ejected matter fell back again to the moon, as such matter falls back again to the earth. He saw Jupiter surrounded with an atmosphere, which accompanied him; and therefore pressed on him; as our air presses on the earth:—He inferred, that it was the same kind of power that maintained the sun and other planets in a round form. He inferred a force to the sun from the circulation round him, and he called it a *gravitation*; and said it was not the earth which described the ellipse, but *the centre of gravity of* the earth and moon. He therefore made a conical pendulum, whose tendency to a vertical position represented the gravitation to the sun, and which was projected at right angles to the vertical plane; and shewed, experimentally, how the different proportions of the projectile and centripetal tendencies produced various degrees of eccentricity in the orbit. He then added another pendulum, describing a cone round the first, while this described a cone round the vertical line, in order to see what point between them described the ellipse. The results of the experiments were intricate and unsatisfactory; but the thought was ingenious. He candidly acknowledged, that he had not discovered the true law of gravitation which would produce the description of an ellipse *round the focus*, owing to his want of due mathematical knowledge; and therefore left this investigation to his superiors. Sir Isaac Newton was the happy man who made the discovery, after having entertained the same notions of the forces which connected the bodies of the solar system, before he had any acquaintance with Dr. Hooker, or knew of his speculations.

1660, The engine for cutting clock and watch wheels.—The chief phenomena of capillary attraction.—The freezing of water a fixed temperature.

1663, The method of supplying air to a diving bell.—The number of vibrations made by a musical chord.

1664, His Micrographia was, by the council of the Royal Society, ordered to be printed; but in that work are many just notions respecting respiration, the composition of the atmosphere, and the nature of light, which were afterwards attributed as discoveries to Mayow and others, who, though we are far from supposing that they stole their discoveries from Dr. Hooke, were certainly anticipated by him.

1666, A quadrant by reflection.

1667, The marine barometer.—The gage for sounding unfathomable depths.

1668, The measurement of a degree of the meridian, with a view to determine the figure of the earth, by means of a zenith sector,

1669, The fact of the *conservatio virium vivarum*, and that in all the productions and extinctions of motion, the accumulated forces were as the squares of the final or initial velocities. This doctrine he announces in all its generality and importance, deducing from it all the consequences which John Bernoulli values himself so highly upon, and which are the chief facts adduced by Leibnitz in support of his doctrine of the forces of bodies in motion. But Hooke was perfectly aware of their entire correspondence with the Cartesian, or common doctrine, and was one of the first in applying the celebrated 39th proposition of Newton's Principia to his former positions on this subject, as a mathematical demonstration of them.

1673, That the catenarea was the best form of an arch.

1674, Steam engine on Newcomen's principle.

1679, That the air was the sole source of heat in burning: That combustion is the solution of the inflammable vapour in air; and that in this solution the air gives out its heat and light. That nitre explodes and causes bodies to burn without air, because it consists of this air, accompanied by its heat and light in a condensed or solid state; and air supports flame, because it contains the same ingredients that gunpowder doth, that is, a nitrous spirit: That this air dissolves something in the blood while it is exposed to it in the lungs in a very expanded surface, and when saturated with it, can no longer support life nor flame; but in the act of solution, it produces animal heat: That the arterial and venal blood differ on account of this something being wanting in one of them. In short, the fundamental doctrines of modern chymistry are systematically delivered by Dr. Hooke in his Micrographia, published in 1664, and his Lampas, published in 1677.

1680, He first observed the secondary vibrations of elastic bodies, and their connection with harmonic sounds. A glass containing water, and excited by a fiddlestick, threw the water into undulations, which were square, hexagonal, octagonal, &c. shewing that it made vibrations subordinate to the total vibration; and that the fundamental sound was accompanied by its octave, its twelfth, &c.

1681, He exhibited musical tones by means of toothed wheels, whirled round and rubbed with a quill, which dropped from tooth to tooth, and produced tones proportioned to the frequency of the cracks or snaps.

1684, He read a paper before the Royal Society, in which he affirms, that some years before that period, he had proposed a method of discoursing at a distance, not by sound, but by sight. He then proceeds to describe a very accurate and complete telegraph, equal, perhaps, in all respects to those now in use. But some years previous to 1684, M. Amontans had not invented his telegraph; so that, though the Marquis of Worcester unquestionably gave the first hint of this instrument, Dr. Hooke appears to have first brought it to perfection. See Telegraph, and a book published 1726, entitled Philosophical Experiments and Observations of the late eminent Dr. Robert Hooke.

We are indebted to him for many other discoveries of less note; such as the wheel barometer, the universal joint, the manometer, screw divided quadrant, telescopic sights for astronomical instruments, representation of a muscular fibre by a chain of bladders, experiments shewing the inflection of light, and its attraction for solid bodies, the curvilineal path of light through the atmosphere.

HOOKED. Hamosus. In botany, applied to the bristle. Hamosa seta. A sort of pubescence, in which the end of the bristle is curved. See Uncinate.

Ho'oked. *a.* Bent; curvated (*Brown*).

HO'OKEDNESS. *s.* (from *hooked.*) State of being bent like a hook.

HOOKER (John), a learned antiquary, was born at Exeter in 1524, and educated at Oxford, after which he travelled into Germany. On his return home, he married and settled at Exeter, for which place he sat in parliament in 1571. He wrote a Description of Exeter, and some part of Holinshed's Chronicle, besides other pieces. He died in 1601.

Hooker (Richard), a famous English divine, commonly called the judicious, was nephew of the above, and born at Heavitree near Exeter, in 1553. He received his education at the grammar-school of that city, from whence, by the kindness of bishop Jewell, he was sent to Corpus Christi college, Oxford; of which he was made bible-clerk, and received also a pension from his patron, who recommended him so strongly to Sandys, archbishop of York, that he sent his son Edwin to be his pupil at Oxford. In 1577 he was chosen fellow of his college, and in 1581 he took orders; soon after which, he contracted a most unhappy marriage with the daughter of a linen-draper in London. In 1584, he was presented to the rectory of Drayton-Beauchamp in Buckinghamshire, where he led an uncomfortable life with his wife for about a year. Being found in this situation by his pupil Mr. Sandys, he represented his tutor's case so pathetically to his father, that he procured for him the mastership of the Temple in 1585. But this place did not suit Hooker's temper, who was fitted for a country retirement; he therefore applied to archbishop Whitgift for a removal to "some quiet parsonage, where he might see God's blessings spring out of his mother earth, and eat his bread in peace and privacy; a place where he might, without disturbance, meditate his approaching mortality, and that great account which all flesh must give at the last day to the God of all spirits." In consequence of this application, he was presented to a living in Wiltshire, where he wrote part of his Ecclesiastical Polity. In 1595, queen Elizabeth presented him to the rectory of Bishop's Bourne, in Kent, where he finished that great work, and his Life in 1600. James I. had the highest opinion of Hooker's invaluable books, as also had his son Charles, who recommended them to his children; and Pope Clement VIII. said of them to Dr. Stapleton, "that there were in them such seeds of eternity, that they will continue till the last fire shall devour all learning." His works have been frequently printed in folio, and a late edition has appeared at Oxford in octavo.

Hooker, in naval matters, a vessel much used by the Dutch, built like a pink, but rigged and masted like a hoy.

HO'OKNOSED. *a.* (*hook* and *nose.*) Having the aquiline nose rising in the middle (*Shakspeare*).

HOOP. *s.* (*hoep*, Dutch.) 1. Any thing circular by which something else is bound, particularly casks or barrels (*Shakspeare*). 2. The whalebone with which women extend their petticoats; a farthingale (*Swift*). 3. Any thing circular (*Addison*).

To HOOP. *v. a.* (from the noun.) 1. To bind or enclose with hoops. (*Shak.*) 2. To encircle; to clasp; to surround. (*Shak.*)

To HOOP. *v. n.* (from *wopyan*, Gothick; or *houpper*, French.) To shout; to make an outcry by way of call or pursuit.

To HOOP. *v. a.* 1. To drive with a shout (*Shakspeare*). 2. To call by a shout.

HOOP, in ornithology. See HOOPOE.

HOOPER (John), a pious English bishop and martyr, was born in Somersetshire, and educated at Oxford. He was for some time a member of the order of white-monks or cistercians, but having imbibed gospel principles, he quitted them and returned to the university. At the time when the six bloody articles were in force, he went abroad, and married a wife in Switzerland, where he applied assiduously to the Hebrew language. At the accession of Edward VI. he returned to England, and was made bishop of Gloucester, to which was added that of Worcester in commendam. Here he laboured with great zeal till the restoration of popery under Mary, when he was arrested and condemned to the flames at Gloucester; which he endured with great resolution in 1555, aged 60. Some of his letters are in Fox's Acts and Monuments.

HOOPER (George), an eminent English prelate, was born at Grimley in Worcestershire, about 1640, and educated at Westminster school, from whence he removed to Christ Church, Oxford, in 1656. In 1672 he became chaplain to Dr. Morley, bishop of Winchester, and shortly after to archbishop Sheldon, who gave him the rectory of Lambeth. In 1677 he became almoner to the princess of Orange, whom he attended to Holland. In 1691 he was appointed dean of Canterbury; and in the first year of queen Anne was made bishop of St. Asaph, from whence he was translated shortly after to Bath and Wells. He died in 1727, and was interred in the cathedral of Wells. He published several books against popery, some sermons, and several miscellaneous tracts, which evince great learning, particularly one entituled, An Inquiry into the State of the ancient Measures, the Attic, Roman, and especially the Jewish. With an Appendix concerning our old English Money and Measures of Content, 1721, 8vo. All his works were printed at Oxford in one vol. folio, 1757 (*Watkins*).

HO'OPER. *s.* (from *hoop*, to enclose with hoops.) A cooper; one that hoops tubs.

HO'OPING-COUGH. *s.* (from *hoop*, to shout.) A convulsive cough, so called from its noise. See TUSSIS.

HOOPOE, in ornithology. See UPUPA.

HOORNBECK (John), professor of divinity in the universities of Leyden and Utrecht, was born at Hærlem in 1617. He understood the Latin, Hebrew, Chaldaic, Syriac, Rabbinical, Dutch, German, English, French, and Italian languages, and published many works, among which are, 1. A refutation of Socinianism, in 3 vols. 4to. 2. A Treatise for the conviction of the Jews. 3. Of the conversion of the Heathens. 4. Theological Institutions, &c. which are written in Latin. Mr. Bayle represents him as a complete model of a good pastor and divinity professor.

To HOOT. *v. n.* (*hwt*, Welsh; *huer*, Fr.) 1. To shout in contempt (*Sidney*). 2. To cry as an owl (*Shakspeare*).

To HOOT. *v. a.* To drive with noise and shouts (*Shakspeare*).

HOOT. *s.* (*huée*, French; from the verb.) Clamour; shout; noise (*Glanville*).

To HOP. *v. n.* (hoppan, Saxon.) 1. To jump; to skip lightly (*Dryden*). 2. To leap on one leg (*Abbot*). 3. To walk lamely, or with one leg less nimble than the other; to limp (*Dryden*). 4. To move; to play (*Spenser*).

HOP. *s.* (from the verb.) 1. A jump; a light leap. 2. A jump on one leg (*Addison*). 3. A place where meaner people dance. (*Ains.*)

HOP, in botany. See HUMULUS. Hops were first brought into England from the Netherlands in the year 1524. They are first mentioned in the English statute-book in the year 1552, viz. in the 5 and 6 of Edw. VI. cap. 5. And by an act of parliament of the first year of king James I. *anno* 1603, cap. 18, it appears that hops were then produced in abundance in England.

HOPS (Laws relating to). By 9 Anne, cap. 121, an additional duty of 3d. a pound is laid on all hops imported, over and above all other duties; and hops landed before entry and payment of duty, or without warrant for landing, shall be forfeited and burnt; the ship also shall be forfeited, and the person concerned in importing or landing, shall forfeit 5l. a hundred weight, 7 Geo. II. cap. 19. By 9 Anne, cap. 12, there shall be paid a duty of 1d. for every pound of hops grown in Great Britain, and made fit for use, within six months after they are cured and bagged; and hop-grounds are required to be entered on pain of 40s. an acre. Places of curing and keeping are also to be entered, on pain of 50l. which may be visited by an officer at any time without obstruction, under the penalty of 20l. All hops shall, within six weeks after gathering, be brought to such places to be cured and bagged, on pain of 5s. a pound. The re-bagging of foreign hops in British bagging for sale or exportation, incurs a forfeiture of 10l. a hundred weight; and defrauding the king of his duty by using twice or oftener the same bag, with

the officer's mark upon it, is liable to a penalty of 40l. The removal of hops before they have been bagged and weighed, incurs a penalty of 50l. Concealment of hops subjects to the forfeiture of 20l. and the concealed hops; and any person who shall privately convey away any hops with intent to defraud the king and owner, shall forfeit 5s. a pound. And the duties are required to be paid within six months after curing, bagging, and weighing, on pain of double duty, two-thirds to the king, and one-third to the informer. No common brewer, &c. shall use any bitter ingredient instead of hops, on pain of 20l. Hops which have paid the duty may be exported to Ireland; but by 6 Geo. II. cap. 11, there shall be no drawback; and by 7 Geo. II. cap. 19, no foreign hops shall be landed in Ireland. Notice of bagging and weighing shall be sent in writing to the officer on pain of 50l. 6 Geo. III. cap. 21. And by 14 Geo. III. cap. 68, the officer shall, on pain of 5l. weigh the bags or pockets, and mark on them the true weight or tare, the planter's name, and place of abode, and the date of the year in which such hops were grown; and the altering or forging, or obliterating such mark, incurs a forfeiture of 10l. The owners of hops shall keep at their casts, &c. just weights and scales, and permit the officer to use them, on pain of 20l. 6 Geo. III. cap. 21. And by 10 Geo. III. cap. 44, a penalty of 100l. is inflicted for false scales and weights. The owners are allowed to use casks instead of bags, under the same regulations, 6 Geo. III. cap. 21. If any person shall mix with hops any drug to alter the colour or scent, he shall forfeit 5l. a hundred weight. If any person shall unlawfully and maliciously cut hop-binds growing on poles in any plantation, he shall be guilty of felony without benefit of clergy. 6 Geo. II. cap. 37. By a late act, five per cent. is added to the duties on hops.

To Hop. *v. a.* (from the noun.) To impregnate with hops (*Arbuthnot*).

Hop (Horn-beam), in botany. See Carpinus.

Hop-tops. The young sprouts of the hop plant; plucked when only a foot above the ground, and boiled, they are eaten with butter as a delicacy, and are very wholesome.

HOPE. *s.* (hopa, Saxon.) 1. Expectation of some good; an expectation indulged with pleasure (*Locke*). 2. Confidence in a future event, or in the future conduct of any person (*Ecclus*). 3. That which gives hope. (*Shak.*) 4. The object of hope (*Dryden*).

Hope, says Dr. Cogan, is the encouragement given to desire; the pleasing expectancy that its object shall be obtained. Without this affection, desire would sink into despondency; like a simple wish, it would remain inactive, and prey upon itself; producing perpetual uneasiness, destitute of any advantage. Hope is so pleasing, and so invigorating an affection, that it is emphatically styled the *Balm of Life*. It preserves the mind from stagnating in its present possessions, corrects the uneasiness of desire, and animates it to struggle with the difficulties it may have to encounter. Hope possesses the happy secret of anticipating the good we desire. By the pleasing sensation it communicates, we already taste the pleasures we seek. Where the object has not been of the first importance, the pleasures of hope have frequently been experienced to surpass those of actual possession: for the imagination is in this affection solely occupied by the supposed advantages and eligible qualities of its object, without attending to any of its imperfections. In its general operation, the indulgence of hope is mixed with certain portions of doubt and solicitude; but when doubt is removed, and the expectation becomes sanguine, hope rises into joy, and has been known to produce transports and ecstasies, equally with the full accomplishment of ardent desires. Thus, according to the degrees of force with which it affects the mind, it may be considered either as an affection or a passion.

As to the medical influence of hope, it has a tendency to calm the troubled action of the vessels, to check and soothe the violent and irregular impetus of the nervous system, and administer a beneficial stimulus to the oppressed and debilitated powers of nature. Hence it has been the constant practice of physicians to support the hopes of their patients in the most alarming diseases of almost every description. But it is peculiarly beneficial in those disorders which proceed from fear, sorrow, and every species of anxiety, or which occasion a great prostration of strength, and dejection of spirits. In intermittent and pestilential fevers, various chronic complaints, the most efficacious remedies have proved inert if administered to persons destitute of hope; while an unmeaning farrago, which could scarcely be deemed innocent, taken with a confidence of success, have exceeded in their efficacy the utmost efforts of the most skilful practitioner.

Hope, therefore, demands a place among the medicaments, which are the mildest and most grateful in their operations, and exhilarating in their effects (*Cogan on the Passions*, p. 283).

Hope, a small river in Essex, which rises near Laindon Hills, and enters the Thames below Mucking.

Hope. *s.* Any sloping plain between the ridges of mountains (*Ainsworth*).

To Hope. *v. n.* (from the noun.) 1. To live in expectation of some good (*Tay*). 2. To place confidence in another (*Psalms*).

To Hope. *v. a.* To expect with desire. (*Dry.*)

HOPE (Dr. John) was the son of a respectable surgeon at Edinburgh, where he was born in 1725. After the usual grammatical education, he entered on the study of physic at his native place. He afterwards went to Paris, and attended the lectures of the cele-

brated Bernard Jussieu. Returning from his travels, he obtained the degree of M. D. from the university of Glasgow, in 1750, and soon after was admitted a member of the Royal College of Physicians at Edinburgh, where he settled for the purpose of engaging in practice. In 1761 he was appointed to the professorship of botany and materia medica, vacant by the death of Dr. Alston. His health becoming impaired, he some years afterwards resigned the professorship of the mat. med. but still continued to hold his botanical appointment; to which was afterwards added the office of physician to the Royal Infirmary. At the time of his death, which happened in November 1786, he held the high office of president of the Royal College of Physicians at Edinburgh, and several years before he had been elected a fellow of the Royal Society of London.

Dr. Hope was indefatigable in promoting the progress of his favourite science, botany. With him originated the botanical garden near Edinburgh, planted on a spot which before was little better than a dreary waste; but which in a few years was stocked with the rarest plants of every clime. It was in this garden that Dr. H. reared the rheum palenatum, obtaining from it roots equal in medicinal efficacy to those imported from the Levant; and accordingly recommending the cultivation of it in this country, on a large scale; a recommendation which has since been adopted with the best results. Here he also reared the plant which yields assafœtidæ. On these subjects he communicated two papers to the Royal Society, besides a third on a rare plant found in the Isle of Skye.

Among the cultivators of natural history in Great Britain, Dr. Hope was one of the first who embraced the Linnean arrangement of plants. "The sexual system (says Dr. Pulteney) was received nearly about the same time in the Universities of Britain, being publicly taught by Professor Martyn, at Cambridge, and by Dr. Hope at Edinburgh. The adoption of it by these learned professors, I consider as the era of the establishment of the Linnean system in Britain." Dr. Hope's name has been given to a beautiful tree, Hopea, which affords a yellow dye; see below.

HOPEA, a genus of the polyandria order, in the polyadelphia class of plants. The calyx is quinquefid, superior; the corol pentapetalous; the stamens are many, and collected into five pencils; there is one style; the fruit is a plum, with a trilocular kernel. There is only one species, the tinctoria, a native of Carolina.

HO'PEFUL. *a.* (*hope* and *full.*) 1. Full of qualities which produce hope; promising; likely to obtain success (*Bacon*). 2. Full of hope; full of expectation of success (*Boyle, Pope*).

HO'PEFULLY. *ad.* (from *hopeful.*) 1. In such manner as to raise hope (*Clarendon*). 2. With hope; without despair (*Glanville*).

HO'PEFULNESS. *s.* (from *hopeful.*) Promise of good; likelihood to succeed (*Wotton*).

HO'PELESS. *a.* (from *hope.*) 1. Wanting hope; being without pleasing expectation; despairing (*Hooker*). 2. Giving no hope; promising nothing pleasing (*Shakspeare*).

HO'PER. *s.* (from *hope.*) One that has pleasing expectations (*Swift*).

HO'PINGLY. *ad.* (from *hoping.*) With hope; with expectation of good (*Hammond*).

HOPLITES, Hoplitæ, formed of ὅπλον, *armour*, such of the candidates at the Olympic, and other games, as ran races in armour. Those who went through the most laborious gymnastic exercises in armour, were often distinguished by the term *Hoplitodromos.*

HOPLOMACHI, in antiquity, gladiators who fought in armour.

HO'PPER. *s.* (from *hop.*) He who hops or jumps on one leg.

HO'PPERS. *s.* (commonly called *Scotch hoppers.*) A kind of play in which the actor hops on one leg.

HO'PPER. *s.* (so called because it is always *hopping*, or in agitation.) 1. The box or open frame of wood into which the corn is put to be ground (*Grew*). 2. A basket for carrying seed (*Ainsworth*).

HOR, in geography, a mountain, or rather a mountainous tract of Arabia Petræa, situated in that circuit which the Israelites took to the south and south-east of Edom, in their way to the borders of Moab. On this mountain Aaron died.

HORÆ, three sisters, daughters of Jupiter and Themis, according to Hesiod, called Eunomia, Dice, and Irene. They were represented by the poets as opening the gates of heaven and of Olympus; and as presiding over the four seasons of the year.

HORÆA, in antiquity, solemn sacrifices, consisting of fruits, &c. offered in spring, summer, autumn, and winter; that heaven might grant mild and temperate weather. These, according to Meursius, were offered to the goddesses called Ὡραι, i. e. *Hours.*

HO'RAL. *a.* (from *hora*, Latin.) Relating to the hour (*Prior*).

HO'RARY. *a.* (*horarius*, Latin.) 1. Relating to an hour (*Hudibras*). 2. Continuing for an hour (*Brown*).

HORATII, three Roman brothers, who, under the reign of Tullus Hostilius, fought against the three Curiatii, who belonged to the Albanian army. Two of the Horatii were first killed; but the third, by his address, successively slew the three Curiatii, and by this victory rendered the city of Alba subject to the Romans.

HORATIUS (Quintus Flaccus), the most excellent of the Latin poets of the lyric and satirical kind, and the most judicious critic

in the reign of Augustus, was the grandson of a freedman, and was born at Venusium 64 B. C. He had the best masters in Rome, after which he completed his education at Athens. Having taken up arms, he embraced the party of Brutus and Cassius, but left his shield at the battle of Philippi. Some time after, he gave himself up entirely to the study of polite literature and poetry. His talents soon made him known to Augustus and Mecænas, who had a particular esteem for him, and loaded him with favours. Horace also contracted a strict friendship with Agrippa, Pollio, Virgil, and all the other great men of his time. He lived without ambition, and led a tranquil and agreeable life with his friends; but was subject to a defluction in his eyes. He died at the age of 57. There are still extant his odes, epistles, satires, and art of poetry; of which there have been a great number of editions. The best have been commonly reckoned those of the Louvre, in 1642, folio; of Paris, 1691, quarto; of Cambridge, 1699; and that with Bentley's emendations, printed at Cambridge in 1711: but we cannot omit to mention Pine's edition of 1733; Foulis, 1744; the sumptuous edition of Dr. Combe and the late Rev. Henry Homer, published in 4to. 1792; the elegant and correct duodecimo edition of Wakefield, 1794; the magnificent folio edition from Didot's press, published at Paris in 1799; and the elaborate and excellent octavo edition of Mitscherlich, published at Leipsic in 1800.

HORD, in geopraphy, is used for a company of wandering people, which have no settled habitation, but stroll about, dwelling in waggons or under tents, to be ready to shift as soon as the herbage, fruit, and the present province is eaten bare: such are several tribes of the Tartars.

HORDEOLUM, (*Hordeolum, i*, n. a dim. of *hordeum*.) An inflammatory tubercle, similar to a small boil, in the margin of the eyelids, somewhat resembling a barleycorn, and thence deriving its name.

Hordeum, (*Hordeum, i*, n. *ab horrore aristæ*, from the unpleasantness of its beard to the touch.). In botany, Barley.

In botany a genus of the class triandria, order digynia. Calyx lateral, two valved, one flowered, growing three together. Nine species, all of which are common to Europe, and the greater number to the meadows, road-sides, or marshes of our own country. Those in most common use are as follows:

1. H. distichum, summer barley. It bears flat ears, divided into two rows, containing large grains, and grows wild in Tartary, on the banks of the Saamara; in the vicinity of Babylon; and in Sicily. This species requires a loose rich soil, and must be sown in dry weather, in April; there are two varieties:

α. H. distichum nudum, the large naked barley, bearing smooth, heavy grains, that afford excellent flour, which, when mixed with that of rye, makes a very palatable nourishing bread, and may therefore be used for puddings and pastry. The beer brewed of it is of a superior richness and flavour; it likewise yields, on distillation, a greater proportion of spirituous liquor than rye: hence it deserves to be preferably cultivated.

C. H. frutescens, bushey barley, one grain of which often produces ten stalks, with broad dark green leaves; it is sown late, and generally about Midsummer; soon ripens; is more prolific, but produces smaller grains than the former variety, and easily degenerates. The Germans sow it very thinly, and in a moist heavy soil.

2. H. vulgare; common barley of four rows. It is productive of longer, though thinner ears and grains, than the first species; and as it thrives well on inferior soils, it is frequently cultivated in preference to the former. In various parts of Germany, and especially in Thuringia, the common barley is very generally sown in autumn, and is not affected by the severest winters.

A variety of this species is the H. cœleste, or the Wallachian barley, also called Egyptian corn. It produces ears and fruit in every respect similar to the former, except that it easily sheds its grains; from which excellent bread is made in Germany, as likewise cakes, groats, &c. Its sowing time is the month of April, when it is deposited in a well-manured middle kind of soil.

3. H. hexastichon, or six-rowed barley. This sort is uncommonly fruitful, so that it is said to produce one-third more in quantity than any other species (except the next following); though, in ordinary seasons, the grains of two of the rows do not attain to maturity. It is sown in a well-prepared and tolerably rich soil, either in April or about Michaelmas; in the former case, it may be mowed so early as Midsummer-day. This species, however, is not so proper for malting and brewing beer, as for being reduced either to groats and flour, or converted into ardent spirits.

4. H. Zeocritou, or bearded barley, or rice barley, with short and coarse stalks, as likewise short though broad ears, divided into two rows. When cultivated on a good soil, and thinly sown, it is the most productive of all the species of barley, and possesses the additional advantage, that it does not droop its ears nor lodge, even in rainy seasons. Each row contains from twelve to fifteen small grains: these yield an excellent white flour, which, for most culinary purposes, may be substituted for that of wheat. In England, the best home-brewed ale is produced from this grain; for the culture of which, we shall give a few directions in the sequel.

5. H. murinum, wall barley; a native, though uncultivated English plant, which grows generally on the sides of roads, walls, &c. Its blossoms appear in May and June: horses and cows are particularly fond of it.

6. H. pratense, meadow barley, grows on pastures, meadows, near the roads, hedges, &c.; blossoms in June and July, and is an agreeable fodder to all kinds of cattle.

7. H. maritimum, sea barley; the production of pasture grounds and gravelly shores.

Cultivation.—Barley, in general, requires a dry, light, mellow and rich soil: hence extraordinary care is requisite where it is to be sown in clay. Immediately after the foregoing crop is removed, the land ought to be ploughed;

which lays it open to be mellowed by the frost and air. In order to promote this effect, *ribbing*, or a peculiar method of ploughing, has been introduced, to expose the greatest extent of surface. For the improvement of dry clayey land, Prof. Bradley recommends a manure of rich dung, ashes, chalk, or lime; and for some particular soils, malt-dust or soot are very useful; but, according to Sir Hugh Plat, soap-boilers' ashes are the most fertilizing substance for the growth of barley, even upon barren grounds.

The comparative advantages of *drilling* and *broad-casting*, are stated by Mr. Peter Smith, of Hornchurch, Essex, as follows: in the last week of February, 1793, he divided three acres of turnip-land with barley, at twelve inches intervals, with two bushels of seed per acre; it was scarified and harrowed across the latter end of March, and horse-hoed the second week in April; at the same time he sowed the grass-seeds, which produced fine plants, far superior to the broad-cast. The produce of the drilled barley was eighteen quarters three bushels, from three acres.

On the same day, he sowed three acres of broad-cast in the same field and state of cultivation, with three bushels of seed per acre, and also sowed the grass-seeds at the same time. The produce of these three acres amounted only to fifteen quarters and three bushels.

As it is of great consequence in the production of this grain, that it may ripen equally and uniformly, to prevent that inequality which would render it less valuable, we shall communicate the following method of remedying this defect. It is certain, that barley which comes up speedily in a dusky soil, will gain great advantages over seed-weeds: to forward, therefore, its vegetation, some farmers take out about one-third from every sack of seed-barley or bear, to allow for the swelling of the grain, which they steep thoroughly in clean water, for at least twenty-four or thirty-six hours, according to the more or less dry constitution of the season. For our part, we would prefer steeping the grain; because in this manner all the light and unripe grains swimming on the top, may be easily skimmed off, and thus perhaps the *smut* at the same time be prevented. Although quicklime has often been recommended to be mixed with the wet barley, before it is sown, yet we agree with those who are of opinion, that it poisons the seeds, absorbs part of its useful moisture, and injures the hands of the sower. As clean water imparts no tenacity, the seed will scatter properly; but being swelled in the proportion of three to four, or two to three, it is necessary to use a fourth or third part more in bulk; to harrow it in, as quickly as possible, after it is sown; and, if convenient, to give it the benefit of a fresh furrow. By this method, it appears above ground, at the farthest, in a fortnight, if these particulars be duly attended to.

A correspondent of the Bath Society states, that in the remarkably dry spring of 1783, he soaked his seed-barley in the black water taken from a reservoir which constantly received the draining of stables. As the light corn floated on the surface, he skimmed it off, and suffered it to rest twenty-four hours. On taking it from the water, he mixed the seed-grain with a sufficient quantity of wood-ashes, to make it spread more regularly, and sowed with it three fields. The produce was sixty bushels per acre, of good clean barley, without any small or green corn, or weeds at harvest. He also sowed several other fields with the same seed, dry, and without any preparation, but the crops were poor, producing only twenty bushels per acre, and much mixed with green corn and weeds.

There is a species of this grain which was introduced into Britain about thirty years since, by Mr. Halliday, and is hence called by his name, or sometimes Siberian barley; it is possessed of qualities that entitle it to particular consideration as an object of importance in agriculture. From a quart of it sown in May 1768, he procured nearly a bushel, which he sowed in April 1769, in drills drawn by a plough; and from this he reaped thirty-six bushels of clean corn. Since that period, Mr. Halliday has made many experiments to ascertain the merits of this prolific grain as bread-corn, and as proper for malting.—He accordingly informs us, in the second volume of the *Georgical Essays*, price 2s. 6d. published in 1771, that its flour makes excellent bread, peculiarly retentive of moisture; and the ale brewed from its malt has a fine colour, flavour, and body. (See the variety of our *second* species, from which it will appear that this grain is the same which Dr. Lochster, in his Latin Dissertation, *On the Medicinal Plants of Norway*, feelingly characterizes, by calling it the *Heavenly Barley*, because it is equally grateful and efficacious.)

As a proof of the extraordinary fecundity of barley, and how much the fertility of the soil contributes to the increase of vegetable productions, we shall mention an instance which occurred in the summer of 1797, at Reichenbach, in Upper Saxony. Two grains of our third species being planted close to each other, in a common garden soil, grew briskly, and spread with no less than one hundred and thirteen stalks, which almost uniformly produced long ears: these contained the surprising number of two thousand five hundred and thirty-four grains, of which two thousand two hundred and five were perfectly ripe and sound, but the remaining three hundred and twenty-nine were of inferior size and weight. According to this computation, one bushel of barley, in a rich and mellow soil, might occupy in planting, at least, twenty acres!

We presume that the following additional observations on the culture of this valuable grain, made by a Norfolk farmer, will not be unacceptable to the practical reader. The best soil, in general, is that which is dry and healthy, rather light than stiff, and yet of sufficient tenacity to retain the moisture. On such land, the grain acquires the best colour and body, is the most nimble in the hand, and has the thinnest rind; qualities which eminently recommend it to the maltster. But, if the land be poor, it should be kept dry and warm; in which case it will often bear better corn than richer land in a cold and wet situation.

The best seed is of a pale colour and brightish cast, without any deep redness or black tinge at the tail. A slight shrivelling of the rind proves it to have a thin skin, and that it has sweated in the mow; both being favourable circumstances. As this grain will grow coarser every succeeding year, it should never be sown for two successive seasons on the same soil.

Sprinkling a little soot over the water in which

seed-barley is to be steeped, has been of great service, by securing it from the depredations of insects. In very dry seasons, barley that has been wetted for malting, and begins to sprout, will come up sooner, and produce as good a crop as any other. If sown after a fallow, three times ploughing is necessary. On lands well manured, clover may be sown with barley; the former of which, after harvest, affords good fodder during the following winter, as well as from the next spring to July; when the land should be fallowed till the succeeding spring, and again sown with barley and clover: this method does not exhaust, but promotes, the fertility of the ground, while it produces large crops. The lightest lands are fit for receiving the seed in April; those of a moist nature, in May: because all soils liable to be infected by weeds, bear the best crops when sown late, with a view to stifle their growth by the ascendancy of the barley.

Although the broad-cast, at two sowings, is the common method, and the usual allowance from three to four bushels per acre, yet much grain is thus unnecessarily wasted. Half the quantity, and even less, if sown equally, would not only afford a better crop, but the corn also would be less liable to lodge; for weak stalks, standing close together, are less capable of resisting the force of winds, or supporting themselves under heavy showers.

Unless the land be very light and rich, the method of setting and drilling will not answer. Although one root will produce eighty stalks, all having good and long ears filled with superior grain, yet it is to be apprehended that this process of planting is too expensive in a country where manual labour is performed by free-born subjects.—Hence it would be preferable to sow thin on poor lands, in order to allow sufficient room for the nourishment of each plant; as it is proved by experience that this simple method is the most beneficial.

It has farther been suggested, when the barley is sown and harrowed in, that, after the first shower of rain, the land should be rolled, to break the clods; which, by closing the earth about the roots, will be of great advantage to it in dry weather. After the barley has been above ground three weeks or a month, it should again be rolled with a heavy roller, to prevent the sun and air from penetrating the ground, to the injury of the roots. This rolling, before the barley branches out, is said to be attended with another advantage, namely, that it will cause the plant to spread into a greater number of stalks, so that if they be thin, the ground will thus be filled, and the stalks strengthened. Whether this expedient be proper for all soils, indiscriminately, we are inclined to doubt, though we do not hesitate to approve of it for very light lands, which are neither loamy nor otherwise too stiff.

Lastly, if the blade grow too luxuriantly, as is the case in warm and wet springs, mowing is said to be preferable to feeding it down by sheep; because the scythe removes only the rank tops, but those animals, being fond of the sweet end of the stalk next the root, will often bite so close as to injure its future vegetation.

With respect to the time when barley is fit to be mowed, farmers frequently fall into the error of cutting it before it is perfectly ripe; thinking it will attain its perfect maturity, if they allow it to lie in the swarth. This, however, is a very common error, as it will shrivel in the field, and afterwards make but an indifferent malt; it also threshes with more difficulty, and is apt to be bruised under the flail. The only certain test of judgment when it is fit to mow, must be from the drooping and falling of the ears, so as to double against the straw. In that state, and not before, it may be cut with all expedition, and carried in without danger of heating in the mow. To obviate such accidents, and secure it from being mow-burnt, it is advisable to prepare a large sheaf, or two sheaves, of straw, closely tied together, which should be placed in the centre, when the stack is commenced; and as the layers of corn rise, other sheaves must be put on the first; so that when the whole stack is completed, and the sheaves are removed, a funnel, or vent-hole, may be continued from the bottom to the top. After withdrawing the sheaves, the stack should be covered with a bottle of straw, before it is thatched.

Barley lying in the mow unthreshed will keep for one or two years, if the above stated method be adopted. But when this grain is converted into malt, it can with difficulty be preserved longer than one year, without being infested by weevils. One of the best remedies to destroy these vermin is dry worm-wood laid in the malt.

Barley, in consequence of its common use, in fermentation, after being malted, has been examined of late with considerable attention by chymists, partly in order to form correct conceptions, if possible, of the nature of the process of fermentation, and partly to ascertain the constituents of barley. Fourcroy and Vauquelin published several ingenious remarks and experiments on it in 1805, and Einhof published a still more elaborate analysis about the commencement of the same year; having examined this grain in different stages of its growth, and after it was fully ripe. When unripe barley-corns are triturated with water, the liquid acquires a milky colour. If this process be continued, adding fresh portions of water as long as the liquid passes off muddy, there remains only a green husky matter. When the matter is macerated a sufficient time in cold water, it acquires a greenish gray colour, and when dry has the appearance of vegetable fibre. The water in which it was macerated, when boiled, deposits a few flakes of albumen, and when evaporated to dryness leaves a small portion of extractive. The water with which the barley was at first triturated is at first milky, and gradually deposits a white powder, yet it does not become transparent, though allowed to stand a considerable time. When filtered, it passes through transparent, while a slimy substance of a greenish gray colour remains upon the filter. This substance possesses the properties of gluten. When the solution, now transparent, and of a yellowish colour, is boiled, it deposits flakes of albumen. It reddens litmus paper, and is strongly precipitated by lime-water, nitrate of lead, and sulphate of iron, indicating the presence of phosphoric salts. The liquid being evaporated to the consistence of a syrup, and the residue treated with alcohol, the solution diluted with water, and the alcohol distilled off, to separate some gluten which still remained, a syrupy matter was obtained, having a sweet taste, which was considered as the saccharine

matter of the barley. A portion refused to dissolve in alcohol. This portion was considered as extractive. The white powder which precipitated from the water in which the barley had been originally triturated, possessed the properties of starch.

PEARL BARLEY and FRENCH BARLEY are barley freed from the husk by means of a mill, the distinction between the two being, that pearl barley is reduced to the size of very small shot, all but the heart of the grain being ground away. See farther upon this subject the articles HUSBANDRY, and MALT.

The seeds obtained from all these, but especially from H. vulgare and H. distichon, are in common use. They are extremely nutritive and mucilaginous, and generally employed to furnish an aporem by boiling in water, in all inflammatory diseases and affections of the chest, especially when there is cough or irritation about the fauces. Amongst the ancients, decoctions of barley, Κριθη, was the principal medicine, as well as aliment, in acute diseases. Barley is freed from its shells in mills, and in this state is called Scotch and French barley. In Holland they make barley into small round grains, somewhat like pearls, which is therefore called pearl barley.

HORDEUM CAUSTICUM. See CEVADILLA.

HORDICALIA, or **HORDICIDIA**, in antiquity, a religious feast held among the Romans, wherein they sacrificed cattle big with young.

HOREB, a mountain of Asia, in Arabia Petræa, at the foot of which is a monastery, where a bishop of the Greek church resides. There are two or three fine springs, and a great number of fruit-trees.

HOREHOUND. In botany. See MARRUBIUM.

HORESTI, a people of Britain, beyond Solway Frith (*Tacitus*), now Eshdale (*Camden*).

HORIA. In zoology. A genus of the class insecta, order coleoptera. Antennas moniliform; feelers four, thicker towards the tip; lip linear, rounded at the end. Two species: 1. H. Testacea, Rufous; antennas and legs black; body long, cylindric; male kind, thighs thicker and toothed. Inhabits Tranquebar. 2. H. Dermestoides. Testaceous, eyes, wings, and breast black. Inhabits Europe.

HORITES, an ancient people, who at the beginning dwelt in the mountains of Seir beyond Jordan (Gen. xiv. 6.) They had princes, and were powerful, even before Esau made a conquest of their country, (*id.* xxxvi. 20—30.) The Horites, the descendants of Seir, and the Edomites, seem afterwards to have been confounded, and to have composed but one people. (Deut. ii. 2. xxxiii. 2. and Judg. v. 4.) They dwelt in Arabia Petræa, and Arabia Deserta, to the south-east of the promised land. We find the Hebrew word חורים *Chorim*, which in the book of Genesis is translated *Horites*, to be used in an appellative sense in several other passages of scripture, and to signify nobles, or great and powerful men (1 Kings xxi. 8, 11. and Neh. ii. 16. iv. 14. v. 7. vi. 17. vii. 5. xii. 17. Eccl. x. 17. Isa. xxxiv. 12. Jer. xxvii. 20. xxxix. 6.); and it is very probable that the Greeks derived from hence their *heroes* in like manner as they derived *Anax* "a king," from the sons of Anak, the famous giant in Palestine.

HORIZON, in geography and astronomy, a great circle of the sphere, dividing the world into two parts or hemispheres; the one upper and visible, the other lower and hid. The word is pure Greek, ὁρίζων, which literally signifies "bounding or terminating the sight;" being formed of ὁρίζω, *termino, definio*, "I bound, I limit;" whence it is also called *finitor*, "finisher."

The horizon is either *rational* or *sensible*. 1. The rational, true, or astronomical horizon, which is also called simply and absolutely the horizon, is a great circle, whose plane passes through the centre of the earth, and whose poles are the zenith and nadir. It divides the sphere into two equal parts or hemispheres. 2. The sensible, visible, or apparent horizon, is a lesser circle of the sphere, which divides the visible part of the sphere from the invisible. Its poles, too, are the zenith and nadir: and consequently the sensible horizon is parallel to the rational; and it is cut at right angles, and into two equal parts, by the vertical. These two horizons, though distant from one another by the semidiameter of the earth, will appear to coincide, when continued to the sphere of the fixed stars; because the earth compared with this sphere is but a point.

The sensible horizon is divided into eastern and western. The eastern or ortive horizon, is that part of the horizon wherein the heavenly bodies rise. The western or occidual horizon is that wherein the stars set. The altitude or elevation of any point of the sphere is an arch of a vertical circle intercepted between it and the sensible horizon. By sensible horizon is also frequently meant a circle which determines the segment of the surface of the earth, over which the eye can reach; called also the physical horizon In this sense we say, a spacious horizon, a narrow scanty horizon. On looking to the figures referred to, under the article DEPRESSION, it will be manifest that the higher the spectator is raised above the earth, the farther this visible horizon will extend, as the respective distances AD, BA, will be the greater. On account of the refraction of the atmosphere, distant objects on the horizon appear higher than they really are, or appear less depressed below the true horizon SS, and may be seen at a greater distance, especially on the sea. M. Legendre, in his memoir on measurements of the earth, in the Mem. Acad. Sci. for the year 1787, says that, from several experiments, he is induced to allow for refraction a 14th part of the distance of the place observed, expressed in degrees and minutes of a great circle. Thus, if the distance be 14000 toises,

the refraction will be 1000 toises, equal to the 57th part of a degree, or 1′ 3″.

HORIZON OF A GLOBE, the broad wooden circular ring in which the globe is fixed. On this are several concentric circles, which contain the months and days of the year, the corresponding signs and degrees of the ecliptic, and the 32 points of the compass.

HORIZON, ARTIFICIAL. A contrivance to be used with Hadley's sextant or quadrant, in taking altitudes of the celestial bodies. The instrument is simply a plain mirror, AB, fig. 6, plate 86, placed perfectly horizontal. Let HE represent a ray of light coming from an object whose altitude is to be observed, the problem therefore is, to measure the angle HEA, or the angle GEB which will be the same, the angle of incidence being always equal to the angle of reflection. To do this we employ Hadley's quadrant, or some other reflecting instrument. (See the article QUADRANT.) The eye of the observer is placed at D in the line EG, and he turns the instrument about, until he sees the reflected image of the object to be observed, through the unsilvered part of the horizon glass G: he then turns round the index glass F by its limb, until the image of the object to be observed (coming in the line HF) is reflected by the index glass F to the silvered part of the horizon glass G, and thence to the eye of the observer at D, covering the image of the same object seen in the artificial horizon AB at E. The observation is now read off, and the angle denoted by the quadrant will be double the angle HEA: for the angle measured by the quadrant will be HIE, which is double HEA, because HE is parallel to HF, the object they tend to being supposed at an infinite distance, and HEA is equal GEB.

The methods of placing a mirror horizontally are very numerous. The most simple and accurate, where it can be used, is a dish containing mercury, but this is not applicable in towns, as the motion of carriages, &c. causes such undulations in the surface of the mercury, as to prevent an accurate observation being made. Figs. 3, 4, and 5, represent a simple and effective instrument, which was invented by Mr. John Adams, of Edmonton; fig. 3 is an elevation, fig. 4 a section, and fig. 5 a plan. It is a brass box *a b*, which has a top *d* fastened in it, made of dark coloured glass; the upper surface of the glass is ground to a perfect plane, and the under surface is a segment of a large sphere. The box is nearly filled with alcohol, leaving a small bubble of air in it, and is mounted upon three screws *e f g*, by which it can be adjusted horizontally, though it stands upon an uneven surface: at *h* is a screw which takes out to fill up the box with alcohol when necessary. In using the instrument, it is set down upon any solid and steady support, and one or other of the feet screws *e f g*, turned until the bubble of air is brought exactly into the centre of the glass, which is known by a circular mark. The upper surface of it is now known to be horizontal, and it is used as before described. Some artificial horizons are nothing more than a flat piece of glass, supported upon three screws, and are adjusted horizontally by applying a common spirit level to their surface.

HORIZO'NTAL. *a.* (from *horizon.*) 1. Near the horizon (*Milton*). 2. Parallel to the horizon; on a level (*Arbuthnot*). 3. Relating to the horizon (*Chambers*).

HORIZONTAL DIAL, is one drawn on a plane parallel to the horizon, having its gnomon or style elevated according to the altitude of the pole of the place it is designed for.

HORIZONTAL DISTANCE, is that estimated in the direction of the horizon.

HORIZONTAL LEAF, in botany, *horizontale folium*. Making a right angle with the stem—having the upper surface turned towards the sky. See ADVERSE.

HORIZONTAL FLOWER. A flower parallel with the surface; a horizontal root; a root running immediately under the surface, and parallel to it.

HORIZONTAL LINE, in perspective, is a right line drawn through the principal point, parallel to the horizon; or it is the intersection of the horizontal and perspective planes.

HORIZONTAL LINE, or base of a hill, in surveying, a line drawn on the horizontal plane of the hill, or that on which it stands.

HORIZONTAL MOON. See *Apparent* MAGNITUDE.

HORIZONTAL PARALLAX. See PARALLAX.

HORIZONTAL PLANE, is that which is parallel to the horizon of the place, or not inclined to it.

HORIZONTAL RANGE. See PROJECTILES.

HORIZO'NTALLY, *ad.* In a direction parallel to the horizon (*Bentley*).

HORMINUM, (*Horminum i.* n. ορμινον, from ορμαω, to incite, named from its supposed qualities of provoking to venery). Garden clary. *Salvia sclara* of Linnéus.

HORN. *s.* (*haurn*, Gothic; horn, Saxon.) 1. The hard bodies which grow on the heads of some graminivorous quadrupeds, and serve them for weapons (*Bentley*). 2. An instrument of wind-music, made of horn (*Dryden*). 3. The extremity of the waxing or waning moon (*Dryden. Thompson*). 4. The feelers of a snail (*Shakspeare*). 5. A drinking cup made of horn. 6. Antler of a cuckold (*Shakspeare*). 7. HORN *mad.* Perhaps mad as a cuckold (*Shakspeare*).

HORN is a substance so generally known, that it is scarcely necessary to give a definition of it. Growing on the heads of various animals, particularly the cloven-footed quadrupeds, horns are serviceable as weapons both of offence and defence. They are not very hard (though some kinds are more so than others) as they may be easily cut with

a knife, or rasped with a file; but they are, from their toughness, not capable of being pounded in a mortar. When strongly heated in a Papin's digester, they are, at length, entirely converted into a mass which exactly resembles gelatine in its properties. In thin plates, they have a degree of transparency, which renders them useful in the making of the more common kind of lanterns; hence also they have been sometimes substituted for glass in windows. When heated properly, they become very soft and flexible, so that their shape may be altered considerably; hence they may be gradually pressed into a mould, and wrought into various forms, as in the making of handles for knives and forks, and in many other instances.

To Mr. Hatchett we are principally indebted for the knowledge we possess of the composition of these and similar bodies; for though they have long been decomposed in many of the processes in which they were employed, they were never before analysed with any care or success. They appear to consist chiefly of a membranous substance, which possesses the properties of coagulated albumen; a small quantity of earthy matter, in which respect chiefly they differ from bone, and probably also a little gelatine. After burning 500 grains of ox-horn, Mr. Hatchett obtained only 1½ grain of residuum, and not so much as half of this proved to be phosphat of lime; from 78 grains of Chamois horn, he obtained only half a grain of residue, which afforded not half that weight of phosphat of lime. The horns of the hart and buck, however, contain a much greater proportion of earthy matter, differing, as appears also from the experiments of Scheele and Rouelle, from bone in no other respect than that of containing a larger proportion of cartilage.

From the distillation of bones and horns, particularly hart's horn, and rectifying the product till it becomes very much attenuated, chymists have long been in the habit of procuring a volatile, thin, and valuable oil, to which the name *Oil of Dippel* has been applied in honour of the first preparer. Almost every other animal substance would, perhaps, furnish this oil, but none of them so easily or so plentifully as the horn abovetioned. See Oil.

Horn and tortoise-shell are applied to mechanical purposes, which require them to be bent and united in various ways; this is performed by the aid of heat, applied either dry, with warmed irons or burning charcoal; or, by softening the horn in boiling water, or in a weak solution of alkali: when thus softened, they will easily adhere. Mr. Aikin gives the following process for making the horn-ring that surrounds a common opera-glass: "A flat piece of horn is cut out, of the requisite shape, the ends to be joined are thinned down by a file, the piece is then put into boiling water till sufficiently supple, and is then rolled round a warm iron cylinder, and held in that position by a vice, so that the ends over-lap each other: another piece of iron, heated and grooved, is then laid upon the seam of the joined ends, and pressed upon the cylinder, and there confined by an iron wire; and the heat of the two, partially melts that portion of the horn, and cements the ends so completely, that no seam or joining can be observed when cold."

Dyeing or staining horn to imitate tortoise-shell. The horn to be died must be first pressed into proper plates, scales, or other flat form, and the following mixture prepared: take of quick-lime two parts, and of litharge one part: temper them together to the consistence of a soft-paste with soap-lie. Put this paste over all the parts of the horn, except such as are proper to be left transparent, in order to give it a nearer resemblance of the tortoise-shell. The horn must remain in this manner covered with the paste till it is thoroughly dry; when, the paste being brushed off, the horn will be found partly opaque and partly transparent, in the manner of tortoise shell, and when put over a foil of the kind of latten called assidue, will be scarcely distinguishable from it. It requires some degree of fancy and judgment to dispose of the paste in such a manner as to form a variety of transparent parts, of different magnitudes and figures, to look like the effect of nature: and it will be an improvement to add semitransparent parts, which may be done by mixing whiting with some of the paste to weaken its operation in particular places, by which spots of a reddish brown will be produced, which, if properly interspersed, especially on the edges of the dark parts, will greatly increase both the beauty of the work and its similitude to real tortoise-shell.

Horn is also a sort of musical instrument, of the wind kind; chiefly used in hunting, to animate and bring together the dogs and the hunters.

The *French* Horn is no other than a wreathed or contorted trumpet. It labours under the same defects as the trumpet itself; but these have of late been so palliated, as to require no particular selection of keys for this instrument. In the beginning of the year 1773, a foreigner, named Spandau, played in a concert at the opera-house, a concerto, part whereof was in the key of C, with the minor-third; in the performance of which all the intervals seemed to be as perfect as in any wind-instrument. This improvement was effected by putting his right hand into the bottom or bell of the instrument, and attempering the sounds by the application of his fingers to different parts of the tube.

Horn or *Spur*, in botany, *Cornu* s. *Calcar*. The hinder hollow part of the nectary in

some flowers, extended in a conical form: as in Orchis, Larkspur, &c.—*Conica productio baseos.*

HORN, or HOORN, a considerable town of the United Provinces, in N. Holland, with a good harbour. Here cattle are fatted that come from Denmark and Holstein. It is seated on the E. side of the Zuyder Zee. Lat. 52. 38. N. Lon. 4. 59. E.

HORN, a town of the Austrian Netherlands, capital of a county of the same name in the bishopric of Liege. Lat. 51. 12. N. Long. 5. 55. E.

Cape-HORN, the most southern part of Terra-del-Fuego, round which all ships now pass that sail into the Pacific Ocean. Lat. 55. 58. S. Lon. 67. 26. W.

HORN (HARTS). See CORNU *Cervi.*

HORN-BEAM, in Botany. See CARPINUS.

HORN BEACH TREE. See CARPINUS.

HORN-BILL, in ornithology. See BUCEROS.

HORNED POPPY. See CELIDONIUM.

HORNS. See MEDICAGO.

HORN FISH. See ESOX.

HORN-SHAPED, in botany. See CORNUTE.

HORN WORK, in fortification, an outwork composed of two demi-bastions joined by a curtain. See FORTIFICATION.

HORNBACH, a town of Deux Ponts, in Germany. Lat. 49. 10. N. Lon. 7. 36. E.

HORNBERG, an ancient town of the Black Forest, in Germany. Lat. 48. 12. N. Lon. 8. 27. E.

HORNBLENDA. Hornblend, in mineralogy, a genus of the class earths, order talcose: consisting of carbonat of magnesia, an equal portion of oxyd of iron, and a nearly equal quantity of carbonat of lime; soft opake, generally of a dull colour, leaving a streak lamellous, breaking into indeterminate fragments; melting in fire, with ebullition, into a black opake globule. Three species.

1. H. vulgaris. Common Hornblend: with scarcely any lustre, of a dull colour when broken in any direction, and exhibiting lamellar pieces or rays. Found in Sweden, Saxony, Portugal, Bohemia, and most European mountains in solid masses, interspersed with other stones: sometimes crystallized in six or eight sided prisms; colour dull, green or blackish; striated or foliated; the crystals transversely striated.

2. H. Labradorica. Labradore Hornblend: sub-opake with a little lustre incurved lamellar pieces, which, when broken, discover a coppery black internal surface. Found in scattered pieces in the island of St. Paul on the Labradore coast: colour grayish-black, with sometimes a shade of coppery red or iron gray according to the direction of the light; fracture mostly curved and foliated.

3. H. Basaltina. Basaltic hornblend: shining, hardish, having a greyish-white streak, when broken longitudinally exhibiting straight lamellar pieces crystallizing into small six or eight sided prisms, terminated by three sided pyramids. Found in balsalt hoffe, wrack and lavas in most parts of Europe to which it adheres very closely: colour black, grayish-green, dark green or yellowish; of a shining surface when broken. Melts before the blowpipe into a grayish enamel with a tinge of yellow.

HO'RNBOOK. *s.* The first book of children, covered with horn to keep it unsoiled (*Locke*).

HORNBURG, a town of Lower Saxony, in the principality of Halberstadt. It is seated on the Isle. Lat. 52. 7. N. Lon. 10. 36. E.

HORNBY, a town of Lancashire, seated on a branch of the river Lune, and beautified with a handsome parochial chapel. Here is a considerable manufactory of cotton. Lat. 54. 6. N. Lon. 2. 20. W.

HORNCASTLE, a town of Lincolnshire, which had a castle, as the name imports; from the architecture of which, and the Roman coins that are sometimes dug up here, it is thought to have been a camp or station of the Romans. The town is well built, and is almost surrounded with water. It is a signiory of 13 lordships. In these lordships there are several chapels for the convenience of the inhabitants, who are at too great a distance from the mother-church, and pretty numerous. It has a market on Saturdays, and fairs in June and August. Lat. 53. 14. N. Lon. 0. 2. W.

HORNDON, a town of Essex, with a market on Saturdays. Lat. 51. 32. N. Lon. 0. 35. E.

HORNE (George), an excellent English prelate, was born in 1730, at Otham, in Kent, of which place his father was rector. He received his education at the grammar-school of Maidstone, and then was elected to a scholarship of University college, Oxford, where he took his degree of B.A. He was afterwards chosen fellow of Magdalen college, and applied himself with great diligence to sacred literature, particularly the Hebrew language. He attached himself to the principles of Hutchinson, which at that time were peculiarly unfashionable at Oxford, and brought upon their abettors much obloquy. In 1753 he entered into orders, and was soon distinguished as an excellent preacher. He appeared also as an acute writer, particularly in controversy, defending the singular doctrines of Hutchinson with dexterity, and attacking Dr. Kennicott's interpolating labours with much learning and adroitness. His exemplary character procured for him, in 1768, the important station of president of his college, about which time he married a daughter of Philip Burton, esq. of Eltham in Kent. He now took his degree of D. D. and was appointed chaplain in ordinary to the king. The year following appeared his beautiful performance, entituled, Considerations on the Life of St. John the Baptist, being the Substance of Sermons which he had preached annually at Magdalen college. In 1776 he served the office of vice-chancel-

tor, and the same year produced his invaluable Commentary on the Psalms, the best work of the kind in our language. In 1781 he was deservedly appointed bishop of Norwich, but unfortunately his infirmities were then so great, that the church could not enjoy much benefit from so pure and evangelical a luminary. "I am come to these steps (said he, as he was entering the palace) at a time of life when I can neither go up them nor down them with safety." He died, full of faith and hope, inspired by the purest principles, and founded on the most solid basis, at Bath, in 1792. His remains rest at Eltham, and a monument has been erected for him in the cathedral of Norwich; but his best monument and praise are his valuable works, which are, 1. A fair, candid, and impartial State of the case between Sir Isaac Newton and Mr. Hutchinson; 2. The Theology and Philosophy in Cicero's Somnium Scipionis explained, &c. 8vo; 3. Spicilegium Shuckfordianum, or a Nosegay for the Critics, in 8vo.; 4. An apology for certain Gentlemen in the University of Oxford, aspersed in a late anonymous Pamphlet, 8vo.; 5. A View of Mr. Kennicott's Method of correcting the Hebrew Text, in 8vo.; 6. Considerations on the Life of St. John the Baptist, 8vo.; 7. Considerations on the poject-ed Reformation of the Church of England, 4to 1772; 8. A Commentary on the Psalms, 2 vols. 4to. and 8vo.; 9. A Letter to Adam Smith, LL. D. on the Life, Death, and Philosophy of David Hume, 12mo.; 10. Letters on Infidelity, 12mo.; 11. A Letter to Dr. Priestley by an Undergraduate, 8vo.; 12. Observations on the Case of the Protestant Dissenters, 8vo.; 13. Five Volumes of Sermons on several Subjects and Occasions; 14. A Charge intended to have been delivered to the Clergy of Norwich at the primacy Visitation, 4to. 1791. The reader will be highly gratified and instructed by reading Mr. Jones's Life of this exemplary divine and apostolical bishop.

HO'RNED. *a.* (from *horn*,) Furnished with horns (*Derham*).

HORNECK (Anthony), a learned divine of the English church, was born in the Lower Palatinate in 1641, and being designed for the ministry, he was sent to study divinity, first at Heidelberg under Spanheim. At the age of 19 he came to England and entered himself of Queen's college, Oxford, of which he was chosen chaplain, and afterwards obtained the vicarage of Allhallows, Oxford. The duke of Albemarle gave him the rectory of Doulton in Devonshire, to which was afterwards added a prebend in the cathedral of Exeter. In 1671 he became preacher at the Savoy, and in 1693 he obtained a prebendal stall at Westminster. He died in 1696. Dr. Horneck was a man of great learning and of exemplary piety. His works are judicious and well known.

HORNERS, those artificers whose business it is to prepare various utensils of the horns of cattle. The horners were a very ancient and considerable fraternity in the city of London some hundred years ago. In the reign of Edward II. they complained to parliament, that by foreigners buying up the horns in England, they were in danger of being ruined, and this business lost to the nation. For this reason was made the statute of 6 Ed. IV. by which the sale of horns to foreigners (except such as the said horners refused) was prohibited; and the wardens had power granted them to search all the markets in London and 24 miles round, and to inspect Stourbridge and Ely fairs, to prevent such practices, and to purchase horns at stated prices. But on plausible pretences this law was repealed in the reign of James I. and thereupon the old evil revived. The horners again applied to parliament, and king Edward's statute was renewed (excepting as to the inspection of the fairs), and still remains in force. The importation of unwrought horns iuto this country is also prohibited. The present company of horners were incorporated January 12, 1638.

HORNET, in Entomology. See Yespa.

HORNFOOTED, *a.* Hoofed.

HORNIUS (George), professor of history at Leyden, was born in the Palatinate, and died in 1670. His principal works are, 1. Historia Ecclesiastica ad ann. 1666; 2. De Originibus Americanis. 8vo.; 3. Geographia verùs & nova.

HORNSEY, a maritime town in the E. Riding of Yorkshire, with a market on Mondays. Near it is a mere two miles long and one broad, famous for its pike and eels. Lat. 53. 56. N. Lon. 0. 1. W.

Hornsey, is also the name of a village in Middlesex, about five miles north of London.

HORNSILVER, the name by which a white flaky precipitate formed by dropping muriatic acid into a solution of silver in nitric acid, was formerly distinguished. This compound is now termed Muriat *of silver*; which see.

HORNSTEDIA. In botany, a genus of the class monandria, order monogynia. Calyx bifid; corol with a long filiform tube and double border, the exterior three parted; nectary tubular; capsule three celled, oblong. Two species—natives of Malacca.

HORNWRACK, in Helminthology. See Flustra.

HORO'GRAPHY. *s.* (ωρα and γραφω.) An account of the hours. Or, the art of making dials, &c. to tell the hours. And the same meaning is generally given to the word Horologiography.

HOROLOGIUM, Ὡρολογιον, composed of ωρα *hora*, "time, hour," and λογος, "speech, discourse," a common name among ancient writers for any instrument, or machine for measuring the hours; (see Chronometer). Such are our clocks, watches, sun-dials, &c. See Clock, Watch, Dial, and Clepsydra.

HOROLOGIUM, in astronomy, *the clock*,

a new southern constellation: it consists of 12 stars of the first six magnitudes, viz. 0. 0. 0. 0. 2. 10.

HOROLOGY, that branch of mechanical science which enables us to measure the portions of time. We judge of the lapse of time by the succession of sensible events; and the most convenient and accurate measures of its quantity are derived from motions, either uniform, or else repeated at equal intervals. Of the former kind, the rotation of the earth on its axis is the most exact, and the situation of its surface with regard to the fixed stars, or less simply, with regard to the sun, constitutes the means for determining the parts of time as they follow each other. See ASTRONOMY and DIALLING. Of the latter kind, the rotation of machinery, consisting of wheel-work, moved by a weight or spring, and regulated by a pendulum or balance, affords instruments of which the utility is well known. The term horology is at present more particularly confined to the principles upon which the art of making clocks and watches is established. A considerable portion of this extended subject of research has been given under the article CLOCK. See also SCAPEMENT, WATCH, &c.

HORO'METRY. *s.* (ὥρα and μετρέω.) The art of measuring hours (*Brown*).

HOROPTER, in optics, is a right line drawn through the point where the two optic axes meet, parallel to that which joins the two pupils.

HOROSCOPE, in astrology, the degree or point of the heavens rising above the eastern point of the horizon at any given time when a prediction is to be made of a future event: as, the fortune of a person then born, the success of a design then laid, the weather, &c. The word is composed of ὥρα *hora*, "hour," and the verb σκέπτομαι, *specto, considero*, "I consider."

HOROSCOPE is also used for a scheme, or figure, of the twelve houses; i. e. the twelve signs of the zodiac, wherein is marked the disposition of the heavens for any given time.

HORREÆ, in Roman antiquity, granaries.

HO'RRENT, *a.* (*horrens*, Lat.) Pointed outward; bristled with points (*Milton*).

HO'RRIBLE, *a.* (*horribilis*, Lat.) Dreadful; terrible; shocking; hideous; enormous (*South*).

HO'RRIBLENESS, *s.* Dreadfulness; hideousness; terribleness; fearfulness.

HO'RRIBLY, *ad.* (from *horrible.*) 1. Dreadfully; hideously (*Milton*). 2. To a dreadful degree (*Locke*).

HO'RRID, *a.* (*horridus*, Lat.) 1. Hideous; dreadful; shocking (*Shakspeare*). 2. Shocking; offensive; unpleasing (*Pope*). 3. Rough; rugged (*Dryden*).

HO'RRIDNESS, *s.* (from *horrid*). Hideousness; enormity (*Hammond*).

HORRI'FIC, *a.* (*horrificus*, Lat.) Causing horrour (*Thomson*).

HORRIPILATIO, (*Horripilatio, onis*, f.) A sense of creeping in different parts of the body. A symptom of the approach of fever.

HORRI'SONOUS, *a.* (*horrisonous*, Lat.) Sounding dreadfully.

HO'RROUR, *s.* (*horror*, Lat.) 1. Terrour mixed with detestation (*Davies*). 2. Dreadful thoughts. (*Shak.*) 3. Gloom; dreariness (*Pope*). 4. (In medicine) Such a shuddering or quivering as precedes an ague fit; a sense of shuddering or shrinking (*Quincy*).

Horrour is that very strong and painful emotion excited by the view or contemplation of something peculiarly atrocious in the conduct of another; by some vice which exceeds the usual extravagance of vice, enormities such as surpass the bounds of common depravity; such as impurities too gross to be named, profligacies too shocking to be repeated, and cruelties that make us shudder at the recital. It may also be excited by the extremes of agony, mental or corporeal, by sufferings and punishments at which our natures recoil. This passion may be deemed the antipode of admiration. See COGAN, p. 171.

HORROUR *of a Vacuum*, was an imaginary principle among the ancient philosophers, to which they ascribed the ascent of water in pumps, and other similar phenomena, which are now known to be occasioned by the weight of the air.

HORROX (Jeremiah), an English astronomer, was born in Lancashire about 1619. He received his academical education at Emanuel college, Cambridge, after which he retired to Hool near Liverpool, where he devoted himself wholly to the study of astronomy and making observations; but was cut off by a sudden death in 1640. He was the first person who ever observed the transit of Venus over the sun's disk, an account of which, drawn up by himself, was published by Hevelius at Dantzic in 1661, under the title, Venus in Solepariter visa, *anno* 1639, Nov. 24. Dr. Wallis published some of his papers in 1673, under the title of Opera Posthuma.

There are two things particularly, which will perpetuate the memory of this extraordinary young man: the one is, his being the first who ever predicted and saw a transit of Venus: the other is, his New Theory of Lunar motions, which Newton himself made the ground-work of all his astronomy relative to the moon; this great man always spoke of Horrox as a genius of the first rank.

HORSE, *s.* (hopr, Saxon.) 1. A neighing quadruped, used in war, and draught, and carriage (*Shakspeare*). 2. A constellation (*Creech*). 3. It is used in the plural sense, but with a singular termination, for horses, horsemen, or cavalry (*Clarendon*). 4. Something on which any thing is supported: as, a *horse* to dry linen on. 5. A wooden machine which soldiers ride by way of pu-

nishment. 6. Joined to another substantive, it signifies something large or coarse; as, *horseface*, a face of which the features are large and indelicate.

To HORSE. *v. a.* (from the noun.) 1. To mount upon a horse (*Bacon*). 2. To carry one on the back. 3. To ride any thing. (*Shak.*) 4. To cover a mare (*Mortimer*).

HORSE. See EQUUS. For the breeding, rearing, &c. of the horse, see BREEDING, COLT, &c. For the methods of training and managing, see HORSEMANSHIP, BREAKING, MANAGE. The names by which those for riding are distinguished in the present day, are road-horses, riding-horses, saddle-horses, nags, chapmen's horses, hacks, hackneys, ladies' horses or pads, hunters, running horses, racers, race-horses, gallopers, managed horses, chargers, troop-horses, post-hacks or post-horses, trotters, cantering-hacks or canterers, double-carrying horses, galloways and ponies.

Concerning the different colours of horses, and their appropriate advantages, see COLOURS.

At the age of two years, or two years and a half, the horse is capable of propagating; and at even an earlier age, the mare is capable of receiving him. But the foals of so early an embrace are generally weakly and ill-formed. The horse should never be admitted to the mare till he is four, or four and a half, even in the case of draft horses; fine horses never before they are six; and Spanish stallions not before they are seven. The mare is generally in season from the beginning of April till the end of June; but their chief ardour for the horse continues only about fifteen or twenty days, and it is this critical period that should be made choice of. The stallion should be sound, well made, vigorous, and of a good breed. For fine saddle-horses, Arabians, Turks, Barbs, and Andalusians, are preferable to all others. Next to these, British stallions, for they are for the most part a progeny from the above, and are very little degenerated. The Italian, and especially the Neapolitan stallions, are also good males to breed from. The best stallions for draught or carriage horses, are those of Naples, Denmark, and especially Holstein and Friesland. For draught horses, they should be at least fifteen hands high; for saddle-horses, from fourteen to fifteen. Nor should the colour be disregarded altogether; of whatever hue, black, gray, bay, or sorrel, it should be bright and perfect in its kind. Independently of which, the stallion selected should have courage, spirit, agility, tractability, a sensible mouth, and sure limbs.

The mare contributes less to the beauty of her offspring than the stallion; but she is said to contribute more to their constitution and stature. For elegant horses, the Spanish and Italian mares are to be preferred; but for draft horses, those of Britain and Normandy. However, when the stallion is good, the mare of any country will produce a fine horse, provided she be well made, and of unexceptionable breed.

Mares go with young eleven months and some days. Contrary to the common custom among quadrupeds, they bring forth standing instead of lying. They continue to bring forth till the age of sixteen or eighteen; and both horses and mares live till near thirty years old. Horses cast their hair once a-year, generally in the spring, but sometimes in the autumn. At this period they are weak, and require more care than at any other season.

In Persia, Arabia, and most eastern countries, the horse is never gelt as in Europe; China, perhaps, furnishes the only exception in the east. This operation greatly diminishes their courage and spirit, and probably their strength; but it makes them more tractable, gentle, and good-humoured. To take all the advantage of their sex, the operation, instead of being performed, as it is often done, at twelve or eighteen months of age, should be delayed till they are two years old, or somewhat more; the gelding will then retain some portion of the natural strength and courage of the stallion.

The English have ever been attentive to an exact cultivation of good horses, and in very early times set a high value on their breed. The esteem in which English horses were held as long ago as the reign of Athelstan, may be collected from a law of that monarch, which prohibited their exportation, unless where they were designed as presents. These, however, must have been native horses, as our commerce was at that period too limited to allow us to have received improvement from any but the German kind, which, nevertheless, could not add much to their value.

No country can bring a parallel to the strength and size of our draught horses, the speed of our racers, or the union of strength and activity in our cavalry.

In this metropolis, there are instances of horses that are able to draw on a plain for a small space, the weight of three ton; and which, with ease, can draw half that weight for a continuance. Some of our mill horses will carry at one load thirteen measures, which at 70lb. each, amounts to 910lb. in the aggregate, being a burthen too heavy for smaller camels. Our race-horses, especially Childers and Eclipse, have literally, as M. Condarmine has observed, outstripped the wind: and our cavalry, by their impetuous charge, have broken through French columns, when the heavier German horses were incapable of accompanying them.

HO'RSEBACK. *s.* (*horse* and *back.*) Riding posture; the state of being on a horse. (*Brown*).

HORSE BEECH, in botany. See CARPINUS.

HORSE BEAN, in botany. See FABA.

HO'RSEBLOCK. *s.* (*horse* and *block.*) A block on which they climb to a horse.

HORSEBOA'T. *s.* (*horse* and *boat.*) A boat used in ferrying horses.

HORSEBO'Y. *s.* (*horse* and *boy.*) A boy employed in dressing horses; a stable-boy. (*Knoll.*)

HO'RSEBREAKER. *s.* (*horse* and *break.*) One whose employment is to tame horses to the saddle (*Creech*).

HORSE CHESTNUT. See ŒSCULUS.

HORSE FLY. See HIPPOBOSCA.

HORSE GUARDS. See GUARDS.

HORSE MUSCLE, in conchology. See MYTILUS.

HORSE-RACING, a useful and favourite sport among the superior classes of our countrymen, as well as of high antiquity. In modern times, however, it has been chiefly brought into notice, and pressed forward into celebrity, by Charles II. and the great duke of Cumberland, uncle to his present majesty. This amusement has been conceived of no small consequence to the breed of excellent horses in the country, and it has hence been patronised by the legislature in a variety of acts passed expressly on this subject. By these, in order to prevent those scandalous cheats and immense losses which have so frequently dishonoured the turf, it is enacted, That no person whatsoever shall enter, start, or run any horse, mare, or gelding, for any plate, prize, sum of money, or other thing, unless such horse, mare, or gelding, shall be truly and *bona fide* the property of, and belonging to, such person so entering, starting, or running the same: nor shall any person enter and start more than one horse, mare, or gelding, for one and the same plate, prize, or sum of money, under the forfeiture of the horse, horses, or value thereof.

Any person who shall enter, start, or run a horse, mare, or gelding, for less value than 50l. shall forfeit the sum of 200l. Any person who shall print, publish, advertise, or proclaim any money, or other thing, to be run for, of less value than 50l. forfeits the sum of 100l. Every race for any plate, prize, or sum of money, to be begun and ended in one day. Horses may run on Newmarket Heath, in the counties of Cambridge and Black Suffolk, and Hambleton, in the county of York, for less value than 50l. without incurring any penalty.

All and every sum and sums of money paid for entering of any horse, mare, or gelding, to start for any plate, prize, sum of money, or other thing, shall go and be paid to the second best horse, mare, or gelding, which shall start or run for such plate, prize, or sum of money, as aforesaid. Provided, that nothing therein contained shall extend, or be construed to extend, to prevent the starting or running any horse, mare, or gelding, for any plate, prize, sum of money, or other thing or things issuing out of, or paid for, by the rents, issues, and profits, of any lands, tenements, or hereditaments; or of or by the interest of any sum or sums of money chargeable with the same, or appropriated to that purpose.

Every horse, mare, or gelding, entered to start or run for any plate, prize, sum of money, or other thing whatsoever, shall pay the sum of 2l. 2s. And be it further enacted, That the owner of every horse, mare, or gelding, entered to start or run for any plate, prize, sum of money, or other thing, shall, previous to the entering or starting such horse, mare, or gelding, pay the sum of 2l. 2s. as the duty for one year, into the hands of the clerk of the course, book-keeper, or other person authorized to make the entry of such horse, mare, or gelding; and if any owner shall, previous to the starting, neglect or refuse to pay the said sum of 2l. 2s. for such entrance, to the clerk of the course, book-keeper, or other person authorized to make the entry as aforesaid, the owner or owners of every such horse, mare, or gelding shall forfeit and pay the sum of 20l.

The following are the rules chiefly observed in racing:

Horses take their ages from May day.
1760 yards are a mile.
240 yards a distance.
Four inches a hand.
Fourteen pounds a stone.

When horses are matched at catch weights, each party may appoint any person to ride, without weighing either before or after the race.

Give and take plates are for horses of fourteen hands high, to carry a stated weight, above or below which more or less is to be carried, allowing seven pounds for every inch. See GIVE AND TAKE.

A whim plate is weight for age, and weight for inches.

A post match is made by inserting the age of the horses in the articles; and the parties possess the privilege of bringing any horse of that age to the post, without making any previous declaration whatever, of name, colour, or qualifications.

For a handicap match, see HANDICAP.

Riders must ride their horses (after running) to the scales to weigh; and the horse of him who dismounts without so doing, or who wants weight when weighed, is deemed a distanced horse.

The horse whose head first reaches the ending post wins the heat.

If a rider fall from his horse, and the horse be rode in by a person who is of proper weight, he will take place the same as if the accident had not happened, provided the second rider go back to the place where the first fell.

Horse's plates (or shoes) not allowed in the weight.

Horses not entitled to start, without having a proper certificate produced of their age, if required, at the time specified in the articles, except where aged horses are included; and in that case, a junior horse may enter without a certificate, provided he carry the same weight as the aged.

All bets are for the best of the plate, where nothing is said to the contrary.

For the best of the plate, where there are three heats run, the horse is deemed second best who wins one.

For the best of the heats, the horse is second that beats the others twice out of three times, though he do not win a heat.

In all bets, either better may demand stakes to be made; and on refusal, may declare the bet void. A confirmed bet cannot be off but by mutual consent.

If one of the parties be absent on the day of running, a public declaration may be made of the bet upon the course, accompanied with a demand, whether any person present will make stakes for the absent party, which proposition

not being acceded to, the bet may be declared void.

Bets agreed to be paid or received in town, or at any other particular place, cannot be declared off on the course.

If a match be made for any particular day, in any meeting at Newmarket, and the parties agree to change the day, all bets must stand; but if in a different meeting, the bets made before the alteration are void.

The person who lays the odds, has a right to choose his horse or the field.

When a person has chosen his horse, the field is what starts against him; but there is no field, if the horse so named has no opponent.

Bets made for pounds, are always paid in guineas.

If odds be laid, without mentioning the horse before it is over, it must be determined as the bets were at the time of making it.

Bets made in running, are not determined till the plate is won, if the particular heat be not mentioned at the time of betting.

Where a plate is won by two heats, the preference of the horses is determined by the places they are in at the termination of the second heat.

Horses running on the wrong side of a post, and not turning back to recover their ground completely, are distanced.

Horses drawn between any of the heats, before the plate is won, are distanced.

Horses are deemed distanced, if their riders cross and jostle, when the articles do not permit it.

If a horse win the first heat, and all others draw, they are not distanced, if he start no more; but if he start again by himself, the drawn horses are distanced.

When bets are made after a heat upon a subsequent event, if the horse so betted upon do not start, the bets so made are void.

When three horses have each won a heat, they only must start for a fourth, to determine on the respective bets yet undecided.

No horse can be distanced in a fourth heat.

When the words "play or pay" are included in a bet, it is thus decided: the horse that does not appear, and is not ready to start, at the time appointed, is the loser; while the other is the winner, although he goes over the course by himself.

In running heats, if it cannot be decided which is first, the heat is then called a dead heat, and the horses may all start again; unless it should happen in the last heat, and then it must only be contested between the two horses, either of which if he had won, would have decided the race; but if there be no two horses thus circumstanced, the others may all start again.

Bets made upon horses winning any number of plates within the year, remain in force till the first day of May.

Money given to have a bet laid, not returned, if not run.

To a proposed bet, whoever first says "done" to it, makes it a confirmed bet.

Matches and bets are void on the decease of either party before they are determined.

The turf most celebrated in the annals of racing, not only in our own country, but all over the world, is Newmarket. The following are the exact distances of its different courses:

	Miles.	Furl.	Yds.
The Beacon Course - - - - -	4	1	138
Last three miles of ditto - - -	3	0	45
From the Ditch-in - - - - -	2	0	97
The last mile and a distance of B. C.	1	1	156
Ancaster mile - - - - - - -	1	0	18
Fox's course - - - - - - -	1	6	55
From the turn of the lands, in -	0	5	184
Clermont Course (from the Ditch) to the Duke's Stand - - - -	1	5	217
Across the Flat - - - - - -	1	2	44
Rowley mile - - - - - - -	1	0	1
Ditch mile - - - - - - - -	0	7	178
Abingdon mile - - - - - - -	0	7	211
Two middle miles of B. C. - - -	1	7	125
Two Years Old Course - - - -	0	5	136
Yearling Course - - - - - -	0	2	147
Round Course - - - - - - -	3	6	93
Duke's Course - - - - - - -	4	0	184
Bunbury's Mile - - - - - -	0	7	208
Dutton's Course - - - - - -	3	0	0

The New Roundabout Course on the Flat is nearly a mile and three quarters.

The great and leading qualifications of a horse bred for the turf, is the purity of his blood, which can only be insured by the truth of his pedigree, and this, to be authentic, must be signed by the breeder, and is in purchase and sale always transferred with the horse. A distinguishing mark of judgment in racing, is first to ascertain the exact speed of the horse, and then to discover of what precise weight he is master; that he may not be retarded in one, by being overloaded with the other. Experience has long since fully demonstrated, upon minute trial (for the trial has been repeatedly made even to the key of the stable door,) that the smallest additional weight is of consequence, and hence judges, whose award has been often appealed to, hesitate not to affirm, that the addition of seven pounds weight carried by one horse, where himself and his antagonist are of the same age, speed, strength, blood and bone, will, if the ground be run honestly over, make the difference of a whole distance, which is 240 yards in four miles only.

The racing weights most in use for the last half century, varied however to age and qualification, have been from about seven stone seven, to nine stone twelve, or ten stone; except in matches with two years old, and yearlings at light or feather weight, and the king's hundreds, for which (till some trifling alterations lately adopted) they carried, at six years old, twelve stone. There are, however, some new clubs, lately instituted by noblemen and gentlemen of distinction, at Bibury and Kingscote, in Gloucestershire, where the weights are advanced beyond the former example, to twelve or thirteen stone, upon a well-founded principle of exciting emulation in breeders to pay some attention to bone as well as to blood.

The certificate of a horse's age generally runs as follows:

Raby Castle, March 1, 1807.

I hereby certify, That my bay colt, Hap Hazard, got by Sir Peter Teazle, dam by Eclipse, was bred by me, and that he was no more than four years old last grass. D——

The article of a match is usually drawn up thus:

October 12, 1798.

Sir H. T. Vane's b. horse, Hambletonian, got

by King Fergus, dam by Highflyer, now six years, carrying 8st. 3lb. is matched against Mr. Cookson's b. horse, Diamond, by Highflyer, (out of the dam of Sparkler,) now five years old, carrying 8st. over the Beacon Course at Newmarket, on Monday in the next Craven Meeting, for 3000 guineas, half forfeit; with a power reserved to alter the day and hour, or either, by consent. H. T. V.
J. C.

This match was run on Monday, March 25, 1799, and won by Hambletonian, (five to four in his favour at starting).

Article of a produce match for Spring Meeting, 1803:

The produce of Sir T. Gascoign's Golden Locks, covered by King Fergus, against the produce of Mr. Fox's dam of Calomel, covered by Beningbrough, for 200 guineas each, half forfeit. Colts to carry 8st. Fillies 7st. 11lb. Last mile and a half. No produce no forfeit.

Produce matches, and produce sweepstakes, are generally made and entered into during the time the respective mares are in foul.

Article of a post produce match of 200 guineas each. Colts to carry 8st. 7lb. Fillies 8st. 4lb.:

Mr. Clifton's Expectation, Mr. Clifton's Eustatia, Mr. Clifton's sister to Gabriel,	COVERED BY Abbe Thulle.
Mr. Dawson's Sincerity, Mr. Dawson's Highflyer mare, out of Sincerity, Mr. Dawson's blind Highflyer mare,	Coriander.

Each to bring the produce of one of these, whichsoever he chooses, to run over Knavesmire when four years old.

Articles for a sweepstakes.

Oxford, ——.

We, whose names are hereunto subscribed, do agree to run for a sweepstakes of 50 guineas each, over Port Meadow, on the last day of Oxford races next ensuing; the horses to carry the gold cup weights, viz. four years old 7st. 7lb. five years old 8st. 7lb. six years old 9st. and aged 9st. 4lb. one four-mile heat. The winner of the gold cup to carry 7lb. extra. The subscribers to name their horses to the clerk of the course, on or before the first day of March next; and the subscription to close on that day. The stakes to be paid into the hands of the clerk of the course before starting, or the subscription to be doubled. Five subscribers, or no race.

Notification for hunters sweepstakes.

Rochester, ——.

A sweepstakes of 10 guineas each, for hunters (carrying 12st. one four-mile heat, to be rode by gentlemen) that have never started for plate, match, or sweepstakes, and to be *bona fide* the property of subscribers, and which have been regularly hunted the preceding season as hunters, and not merely to have obtained the name; and that have never had a sweat with an intention to run before the first of May next ensuing. Certificates of their having hunted regularly to be produced (if required) from the owner or owners of the hounds with which they have hunted; and to be named to the clerk of the course on or before the first of April next; and the stakes to be deposited at the same time, or the horse not permitted to start. Six subscribers, or no race. See the articles Jockey Club, King's Plate, Training, and Turf.

HORSE *Radish*, in botany. See Cochleakiæ.

When steeped and digested in vinegar, during a fortnight, it is said effectually to remove freckles in the face.

In paralytic complaints, horse-radish has sometimes been applied, with advantage, as a stimulating remedy to the parts affected. A strong infusion of it excites vomiting; and is greatly recommended by Sydenham in dropsies, particularly such as succeed intermittent fevers. Prof. Beckmann mentions this vegetable among the most proper substances for tanning or currying leather: and we believe it is sometimes used in dyeing a straw-colour.

Horse (River.) See Hippopotamus.

Horse (Sea.) See Hippocampus.

Horse-shoe, a plate of iron contrived for the preservation of the horse's foot to the size of which it is adapted. See Shoeing and Hoof.

Horse-shoe, in fortification, is a small work, sometimes of a round and sometimes of an oval figure, enclosed with a parapet, sometimes raised in the moat or ditch, or in low grounds, and sometimes to cover a gate, or to serve as a lodgment for soldiers. See Fortification.

Horse-shoe-head, an affection of the heads of infants, in which the sutures of the skull are too open, or too great a space occurs between them; so that the aperture is frequently not closed, or the cranium in that part does not become hard and firm, till the age of puberty. This opening increases as often as the child takes cold; and, if it continue for a long series of years, it is generally regarded as a sign of weakness, or short life. In this case, the usual practice is to rub the head occasionally with warm rum or brandy, mixed with the white of an egg, or a little palm-oil: it will also be advisable to wear a small cushion over such aperture, by which it will not only be protected from the cold air, but likewise from receiving sudden injury; and consequently the closing of it will be promoted. Such infants ought to be watched with additional care, to prevent any accidental falls, or blows on the head, which to them would be fatal. Sometimes the disorder arises from a collection of waters in the head, called an *hydrocephalus*, which see.

Horse-tail, in botany. See Equisetum.

Horse Tail, Shrubby. See Ephedra.

Horse Tongue. See Ruscus.

Horse Vetch, in botany. See Hippocrepis.

HO'RSECOURSER. *s.* (*horse* and *courser.*) 1. One that runs horses, or keeps horses for the race. 2. A dealer in horses (*Wiseman*).

HO'RSEDUNG. *s.* (*horse* and *dung.*) The excrement of horses (*Peacham*).

HORSEE'MMET. *s.* (*horse* and *emmet.*) Ant of a large kind.

HO'RSEFLESH. *s.* (*horse* and *flesh.*) The flesh of horses (*Bacon*).

O'RSEFLY, *s.* (*horse* and *fly.*) A fly

that stings horses, and sucks their blood. See Musca, and Hippobosca.

HO'RSEHAIR. *s.* (*horse* and *hair.*) The hair of horses (*Dryden*).

HOR'SELAUGH, *s.* (*horse* and *laugh.*) A loud violent rude laugh (*Pope*).

HO'RSELEECH. *s.* (*horse* and *leech.*) 1. A great leech that bites horses. (*Shaksp.*) 2. A farrier (*Ainsworth*).

HO'RSELITTER. *s.* (*horse* and *litter.*) A carriage hung upon poles between two horses, in which the person carried lies along. (*Macca.*)

HO'RSEMAN. *s.* (*horse* and *man.*) 1. One skilled in riding (*Dryden*). 2. One that serves in wars on horseback. (*Arb.*) 3. A rider; a man on horseback (*Prior*).

HORSEMANSHIP, the art of riding with grace, safety, and fearlessness, on horseback. To attain which, we shall offer a few rules and observations, for the benefit of those who do not know how to ride, rather than the perusal of those who do. The man who is adroit in this exercise, having examined the condition of his horse, and its furniture, approaches him gently, opposite the shoulder of the near or left side; when facing the wither, he takes the reins of the bridle with a tuft of the mane firmly in his left hand, the bridle being of about the same length it is held at when mounted. The horse standing still, which he should always be accustomed to do when mounting, and not before, his right hand is employed in supporting the stirrup on that side, for the reception of his left foot, when that is safely introduced, his right-hand is removed from the stirrup to the hinder part of the saddle, where it forms a lever to assist in raising the right leg from the ground, and in passing it gradually and steadily over the body of the horse, when it falls readily into the stirrup on the opposite side. When first the reins are taken in hand, due observance should be made of the medium at which they are to be held; that is, not tight enough to make the horse uneasy, or run back, nor slack enough to afford him an opportunity to set off before his rider is firmly seated.

When mounted, the body should be kept easy, but erect, inclining rather backwards than forwards; the weight chiefly resting upon the horse's posteriors, with a moderate pressure of both the legs upon the sides of the horse. To preserve which position free from constraint and stiffness, the proper length of the stirrups is a matter material to be attended to; for unless they are in length adapted to the stature of the rider, it will be impracticable for him to keep a firm and graceful seat, particularly with violent, vicious, or restive horses, upon many emergencies. The general error, amongst inexperienced horsemen, is that of having their stirrups ridiculously short, by which they strangely conceive they insure their own safety; though the opposite is the fact, and especially with a spirited horse; for the knees being lifted above the skirt of the saddle, the thighs are rendered useless, the legs prevented from affording their necessary assistance, and the rider is left without a seat or fulcrum by which he can maintain his position; and between alternate rocking and swinging, is left entirely at the mercy of his horse. The stirrups should be exactly of that length in which, the rider sitting upon his horse, either still or in action, may be able to disengage his foot from them by a single motion, or be able to catch or recover them with equal facility.

These remarks, properly attended to, the body will be found easy, firm, and commanding; free from all those rockings, jerkings, and twistings, sometimes over the horse's head, at others over his tail, too often displayed by the inexperienced. The left-hand is termed the bridle-hand, and the left elbow must come nearly into gentle contact with the body, which it has always for its support in any sudden jump, start, or stumble, of the horse. It is impossible to lay down fixed and invariable rules for the precise distance of the left-hand from the breast, or its height from the saddle; horses differ much in their mouths; and the bridle-hand must, in consequence, be held higher or lower, and the reins longer or shorter in proportion. The right-hand (termed, in racing, the whip-hand) should be held in a kind of corresponding uniformity with the left, acting also occasionally in the use of the reins, and the management of the mouth; and this is the more necessary, as every complete horseman, or perfect sportsman, can manage the reins, of even a run-away horse, as well with one hand as the other.

The hand should always be firm, but delicately pliable, and alive to every motion of the mouth; for, by giving and taking properly, the horse has better opportunity to display his spirit, and to demonstrate the pleasure he receives, in being encouraged to champ upon the bit. Gentleness, good nature, and especially a thorough command of temper, are excellent qualifications for a rider; and while they will prevent a horse from acquiring a thousand ill habits produced by the indulgence of passion, and an unrestrained use of the whip, they will go far to eradicate whatever mischief there may be in a horse's natural disposition.

Horses that are addicted to starting, do it from fear, and not from obstinacy; the recollection of which should instantly excite a consideration of pity and tenderness in the rider; but it is much to be regretted, that nine times out of ten, this very timidity is productive of the most severe and unmerited punishment; and it is no uncommon thing to see a much greater brute than the animal he bestrides, most unmercifully beating, whipping, and spurring a poor creature, for possessing a sensation in common with himself. That horses *may* be made to pass objects of dislike and dread by such means is not to be disputed; it is, however, just as certain, that lenity, patience, and mild persuasion, are far preferable, inasmuch as they are less troublesome, less cruel, and infinitely more effectual modes of accomplishing the same point. It is certainly the business of the rider to conquer, and become master of his horse; but coercive and violent measures should never be resorted to, till the more lenient attempts have failed.

The use of the legs is a very important consideration, not only in the due correction of a horse that starts, but in the airs taught in the manage; where the horse is supported and helped by the hands and legs in every action required, in consequence of which he is technically said to perform his airs by aids from the rider. When a horse, in starting, begins to fly on one side, for the purpose of turning from the object he wishes to avoid, the instantaneous, strong, and sudden pressure of the leg on that side,

counteracts his spring, and, with the joint exertion of the rein and wrist, immediately brings him straight; at which moment, the same use being made of both legs, as was just before made with one, he has no alternative, but to submit to the determined correction, and soon passes the object of dread or dislike, and proceeds in his proper course. As the legs are of great utility in the due management of a horse, so they are the very reverse, if improperly brought into action. Nothing sooner denotes the inability of a rider, than to see the legs swinging like a pendulum, and alternately beating against the horse's sides: if he be a spirited horse, and well broke, he conceives himself intentionally excited to brisker action; if, on the contrary, he be a dull and sluggish goer, it only adds to his habitual callosity.

HORSEME'AT. *s.* (*horse* and *meat.*) Provender (*Bacon*).

HO'RSEPLAY. *s.* (*horse* and *play.*) Coarse, rough, rugged play (*Dryden*).

HO'RSEPOND. *s.* (*horse* and *pond.*) A pond for horses.

HORSESTE'ALER. *s.* (*horse* and *steal.*) A thief who takes away horses. (*Shaksp.*)

HO'RSEWAY. *s.* (*horse* and *way.*) A way by which horses may travel. (*Shaksp.*)

HORSHAM, a town of Sussex, seated near St. Leonard's forest, 38 miles from London. It has its name from Horsa, brother to Hengist the Saxon; and is one of the largest towns in the county. It has sent members to parliament ever since the 30th of Edward I. and is the place where the county gaol is held, and often the assizes. It is a borough by prescription, with the title of two bailiffs and burgage-holders within and without the borough, &c. who elect the members of parliament. The market is on Saturdays; and is noted for poultry. Lat. 51. 8. N. Lon. 0. 12. W.

HORTAGILERS, in the grand seignior's court, upholsterers, or tapestry-hangers.

HORTA'TION. *s.* (*hortatio*, Latin.) The act of exhorting; a hortatory precept; advice or encouragement to something.

HO'RTATIVE. *s.* (from *hortor*, Latin.) Exhortation; precept by which one incites or animates (*Bacon*).

HO'RTATORY. *a.* (from *hortor*, Latin.) Encouraging; animating; advising to any thing.

HORTENSIUS (Quintus), a celebrated orator, who began to distinguish himself by his eloquence, in the Roman forum, at the age of nineteen. His friend and successor Cicero speaks with great eulogium of his oratorical powers, and mentions the uncommon extent of his memory. He was prætor and consul, and died 50 years before Christ, aged 53. His orations are not extant.

HO'RTICULTURE. *s.* (*hortus* and *cultura*, Latin.) The art of cultivating gardens.

HO'RTULAN. *a.* (*hortulanus*, Latin.) Belonging to a garden (*Evelyn*).

HORTUS SICCUS, a dry garden, an appellation given to a collection of specimens of plants, carefully dryed and preserved. The value of such a collection is very evident, since a thousand minutiæ may be preserved in the well-dried specimens of plants, which the most accurate engraver would have omitted. We shall, therefore, give some methods of drying and preserving an hortus siccus. Specimens ought to be collected when dry, and carried home in a tin box. Plants may be dried by pressing in a box of sand, or with a hot smoothing iron. Each of these has its advantages. If pressure be employed, a botanical press may be procured. The press is made of two smooth boards of hard wood, eighteen inches long, twelve broad, and two thick. Screws must be fixed to each corner with nuts. If a press cannot easily be had, books may be employed. Next some quires of unsized blotting paper must be provided. The specimens, when taken out of the tin box, must be carefully spread on a piece of pasteboard, covered with a single sheet of the paper quite dry; then place three or four sheets of the same paper above the plant, to imbibe the moisture as it is pressed out; it is then to be put into the press. As many plants as the press will hold may be piled up in this manner. At first they ought to be pressed gently. After being pressed for twenty-four hours or so, the plants ought to be examined, that any leaves or petals which have been folded may be spread out, and dry sheets of paper laid over them. They may now be replaced in the press, and a greater degree of pressure applied. The press ought to stand near a fire, or in the sunshine. After remaining two days in this situation, they should be again examined, and dry sheets of paper be laid upon them. The pressure then ought to be considerably increased. After remaining three days longer in the press, the plants may be taken out, and such as are sufficiently dry may be put on a dry sheet of writing-paper. Those plants which are succulent may require more pressure, and the blotting paper again be renewed. Plants which dry very quickly, ought to be pressed with considerable force when first put into the press; and if delicate, the blotting-paper should be changed every day. When the stem is woody, it may be thinned with a knife, and if the flower be thick or globular as the thistle, one side of it may be cut away; as all that is necessary, in a specimen, is to preserve the character of the class, order, genus, and species. Plants may be dried in a box of sand in a more expeditious manner, and this method preserves the colour of some plants better. The specimens, after being pressed for ten or twelve hours, must be laid within a sheet of blotting-paper. The box must contain an inch deep of fine dry sand, on which the sheet is to be placed, and then covered with sand an inch thick; another sheet may then be deposited in the same manner, and so on, till the box be full. The box must be placed near a

fire for two or three days. Then the sand must be carefully removed, and the plants examined. If not sufficiently dried, they may again be replaced in the same manner for a day or two.

To retain the various points of form, colour, structure, with as little deviation as possible, moderate heat, moderate pressure, and speedy absorption of the vegetable juices seem indispensably requisite. The plants to be preserved, should with this view be spread carefully over clean paper, then covered with fine sand, then with a second sheet of paper spread over the sand, and the whole pressed by an iron moderately heated for the purpose; or, which is better, pressed greatly by a weight of a different kind, and exposed, while pressed, to the heat of a moderate fire, till the whole be perfectly exsiccated. Mucilage of fine gum-arabic or gum tragacanth, will be found the best paste for cementing them to the papers on which they are to remain.

HOSANNA, in the Hebrew ceremonies, a prayer rehearsed on the several days of the feast of tabernacles. The word is Hebrew, and literally signifies, *save us now*, or, *save us we pray*.

Hosanna Rabba, or Grand Hosanna, a name given by the Jews to their feast of tabernacles.

HOSE. *s.* plur. *hosen.* (hoꞅa, Saxon.)

1. Breeches. (*Shakspeare.*)

2. Stockings; coverings for the legs. *Gay.*

HOSEA, a canonical book of the Old Testament, so called from the prophet of that name, its author, who was the son of Beri, and the first of the 12 minor prophets. He lived in the kingdom of Samaria, and delivered his prophecies under the reign of Jeroboam II. and his successors, kings of Israel; and under the reigns of Uzziah, Jotham, Ahaz, and Hezekiah, kings of Judah. His prophecies are chiefly directed to the 10 tribes before their captivity, reproving them for their sins, exhorting them to repentance, and threatening them with destruction in case of impenitence; but comforting the pious with the promise of the Messiah, and of the happy state of the church in the latter days. His style is so abrupt, sententious, and concise, that it borders sometimes on obscurity. And how should it not, when the subjects of 60 years prophecy are condensed into a few pages? But it is in many places moving and pathetic, and not seldom beautiful and sublime. Hosea is a bold reprover, not only of the vices of the people, but also of their kings, princes, and priests. Like most other of the Hebrew Prophets, however, he tempers his denunciations of vengeance with promises of mercy; and the transitions from the one to the other are often sudden and unexpected. He is generally supposed to have prophesied from the year 785 to 725 before the christian æra.

HOSIER. *s.* (from *hose.*) One who sells stockings (*Swift*).

HOSPINIAN (Rodolphus), a learned Swiss, born at Altdorf, near Zurich, in 1547. Having gone through his academical studies, he was ordained in 1568. In 1571 he was made provisor of the abbey school at Zurich, and afterwards minister of the abbey church. He died in 1626. He wrote several able works on the history of popish errors and superstitions, which have been collected with his other writings, in 7 vols. folio.

HO'SPITABLE. *a.* (*hospitabilis*, Latin.) Giving entertainment to strangers; kind to strangers (*Dryden*).

HO'SPITABLY. *ad.* (from *hospitable.*) With kindness to strangers (*Prior*).

HO'SPITAL, popularly spittal, a place or building erected, out of charity, for the reception and support of the poor, aged, sick, and otherwise helpless. The word is formed of the Latin *hospes*, host, stranger. See Host. In the early ages of the church, the bishop had the immediate charge of all the poor, both sound and diseased, as also of widows, orphans, strangers, &c. When the churches came to have fixed revenues allotted them, it was decreed, that at least one fourth part thereof should go to the relief of the poor; and to provide for them the more commodiously, many houses of charity were built, which are since denominated hospitals. They were governed wholly by the priests and deacons, under the inspection of the bishop. In course of time, separate revenues were assigned for the hospitals; and particular persons, out of motives of piety and charity, gave lands and money for erecting of hospitals. When the church discipline began to relax, the priests, who till then had been the administrators of hospitals, converted them into a sort of benefices, which they held at pleasure, without giving account thereof to anybody; reserving the greatest part of the income to their own use; so that the intentions of the founders were frustrated. To remove this abuse, the council of Vienna expressly prohibited the giving any hospital to secular priests in the way of a benefice; and directed the administration thereof to be given to sufficient and responsible laymen, who should take an oath, like that of tutors, for the faithful discharge thereof, and be accountable to the ordinaries. This decree was executed and confirmed by the council of Trent.

In Britain, hospitals are buildings properly endowed, or otherwise supported by charitable contributions, for the reception and support of the poor, aged, infirm, sick, or helpless. A charitable foundation laid thus for the sustenance and relief of the poor, is to continue for ever. Any person seised of an estate in fee, may, by deed inrolled in chancery, erect and found an hospital, and nominate such heads and governors therein as he shall think fit; and this charitable foundation shall be incorporated, and subject to the inspection and guidance of the

heads and visitors nominated by the founder. Likewise such corporation shall have, take, and purchase lands, so as not to exceed 200l. a year, provided the same be not held of the king; and make leases, reserving the accustomed yearly rent. See CORPORATION.

Most of the counties in England have hospitals appropriated for the reception and comfort of the sick and infirm: but in London and its neighbourhood, there are many excellent institutions under this name, intended either for the instruction of youth, the comfort and restoration of the sick, or for the support of the aged: of these we can barely mention their names. But most of them are so universally known by their beneficial effects, that a minute account may the rather be spared. They are, *Aske's*, or *Haberdasher's Hospital*, *St. Bartholomew*, *Bethlem*, *Bridewell*, *Charter-house*, *Chelsea*, *Christ's*, or the *Blue Coat*, *Emanuel*, the *Foundling*, *French*, *St. George's*, *Greenwich*, *Guy's*, the *Lock*, *London*, *St. Luke's*, the *Lying-in*, the *Magdalen*, *St. Peter's*, *Small-Pox*, and *St. Thomas's Hospitals*.

HOSPITAL (William Francis Antony, marquis of), a great mathematician of France, was born of an ancient family in 1661. He was a geometrician almost from his infancy; for one day being at the duke of Rohan's, where some able mathematicians were speaking of a problem of Pascal's which appeared to them extremely difficult, he ventured to say that he believed he could solve it. They were amazed at such presumption in a boy of fifteen, for he was then no more; nevertheless, in a few days he sent them the solution. He entered early into the army, and was a captain of horse; but being extremely short-sighted, and exposed on that account to perpetual inconveniencies and errors, he at length quitted the army, and applied himself entirely to his favourite amusement. He contracted a friendship with Malbranche, and took his opinion upon all occasions. In 1693 he was received an honorary member of the academy of sciences at Paris; and he published a work upon Sir Isaac Newton's analysis, entitled, *L'Analyse des Infiniments petits*. He was the first in France who wrote upon this subject; and on this account was regarded almost as a prodigy. He engaged afterwards in another work of the mathematical kind, in which he included *Les Sections Coniques, les Lieux Geometriques, la Construction des Equations, et Une Theorie des Courbes Mechaniques*: but a little before he had finished it, he was seized with a fever, of which he died Feb. 2, 1704, aged forty-three. It was published after his death, and is a very valuable work considering the time in which it was written. It was translated into English by Stone.

HO'SPITALER, one that entertains and provides for poor people, travellers, &c.

HOSPITALERS, HOSPITALARII, more particularly denote an order of religious knights, who built an hospital at Jerusalem, wherein pilgrims were received. To these pope Clement V. transferred the effects and revenues of the templars; whom, by a counsel held at Vienna, he suppressed, for their many and great misdemeanours.

HOSPITALITY, the practice of entertaining strangers. Dr. Robertson, speaking of the middle ages, says, "Among people whose manners are simple, and who are seldom visited by strangers, hospitality is a virtue of the first rank. This duty of hospitality was so necessary in that state of society which took place during the middle ages, that it was not considered as one of those virtues which men may practise or not, according to the temper of their minds and the generosity of their hearts. Hospitality was enforced by statutes, and those who neglected the duty were liable to punishment. The laws of the Slavi ordained that the moveables of an inhospitable person should be confiscated, and his house burnt. They were even so solicitous for the entertainment of strangers, that they permitted the landlord to steal for the support of his guest."

The hospitality of our British ancestors, particularly of the great and opulent barons, hath been much admired. Their castles were capacious palaces, daily crowded with their numerous retainers, who were always welcome to their plentiful tables.

Those who are conversant with the books of the Mosaic history, will recollect that hospitality was a prominent feature in the character of the patriarch *Abraham*. It is in allusion to his conduct, and that of Lot, that hospitality is recommended by Paul, because "thereby some have entertained angels unawares." Hebrews xiii. 2.

To HO'SPITATE. *v. a.* (*hospitor*, Latin.) To reside under the roof of another (*Grew*).

HOSPODAR, a title borne by the princes of Walachia and Moldavia, who receive the investiture of their principalities from the grand Seignior.

HOST, *s.* (*hoste*, Fr. *hospes*, *hospitis*, Lat.) 1. One who gives entertainment to another. 2. The landlord of an inn (*Shakspeare*). 3. (from *hostis*, Latin.) An army; numbers assembled for war (*Dryden*). 4. Any great number (*Shakspeare*). 5. (*hostia*, Lat.) The sacrifice of the mass in the Romish church; the consecrated wafer.

The Roman Catholics pay adoration to the host upon a false presumption that the elements are no longer bread and wine, but transubstantiated into the real body and blood of Christ. See TRANSUBSTANTIATION.

The vessel whereon the hosts are kept, is called the *cibory*, being a large covered chalice.

To HOST. *v. n.* (from the noun.) 1. To take up entertainment (*Shakspeare*). 2. To encounter in battle (*Milton*). 3. To review a body of men; to muster. (*Sp.*)

HO'STAGE. *s.* (*ostage*, French.) One

given in pledge for security of performance of conditions (*Arbuthnot*).

HO'STEL. } s. (*hostel, hostelerie*,) Fr.
HO'STELRY. } An inn (*Ainsworth*).

HO'STESS. s. (*hostesse*, French.)

1. A female host; a woman that gives entertainment (*Dryden*). 2. A woman that keeps a house of public entertainment (*Temple*).

HOSTESS-SHIP. s. (from *hostess.*) The character of an hostess (*Shakspeare*).

HOSTIA, in antiquity, a victim offered in sacrifice to a deity. We read of many kinds of *hostiæ*: as *hostiæ puræ*, sheep or lambs of ten days old; *hostiæ bidentes*, animals of two years old; *hostiæ piaculares*, expiatory sacrifices, &c.

HO'STILE. a. (*hostilis*, Latin.) Adverse; opposite; suitable to an enemy (*Dryden*).

HOSTI'LITY. s. (*hostilité*, Fr. from *hostile.*) The practices of an open enemy; open war; opposition in war (*Hayward*).

HO'STLER. s. (*hostelier*, from *hostel*, French.) One who has the care of horses at an inn (*Sp.*).

HO'STRY. s. (corrupted from *hostelry.*) A place where the horses of guests are kept (*Dryden*).

HOT. a. (hat, Saxon).

1. Having the power to excite the sense of heat; contrary to cold; fiery (*Newton*). 2. Lustful; lewd (*Shakspeare*). 3. Violent; furious; dangerous (*Clarendon*). 4. Ardent; vehement; precipitate (*Denham*). 5. Eager; keen in desire (*Locke*). 6. Piquant; acrid: as, *hot* as mustard.

HOT-BEDS, in gardening, are made either with fresh horse-dung or tanner's bark; and covered with glasses, to protect them from the severity of the wind and weather.

Where horse-dung is employed, dig a trench of a length and width proportionable to the frames for which you intend it; and if the ground be dry, make it about a foot or a foot and a half deep; but if wet, not above six inches: then wheel the dung into the opening, observing to stir every part of it with a fork, and to place it exactly even and smooth on every part of the bed, laying the bottom part of the heap, which is commonly free from litter, upon the surface of the bed: and if it be designed for a bed to plant out cucumbers to remain there, make a hole in the middle of the place designed for each light, about ten inches over and six deep, which should be filled with good fresh earth, thrusting in a stick to shew the places of the apertures; then cover the bed all over with the earth that was taken out of the trench, about four inches thick, and put it on the frame, letting it remain till the earth be warm, which commonly takes place in three or four days after the bed is made, and then the plants may be placed in it. Yet if your hot-bed be designed for other plants, there need be no apertures made in the dung; but after having smoothed the surface with a spade, cover the dung about three or four inches thick with good earth, putting on the frames and glasses, as before. In making these beds, care must be taken to settle the dung close with a fork; and if it be pretty full of long litter, it should be trod down equally on every part. During the first week or ten days after the bed is made, cover the glasses but slightly in the night, and in the day-time carefully raise them, to let out the steam; but as the heat abates, the covering should be increased; and as the bed grows cold, new hot dung should be added round the sides of it.

Hot-beds made with tanner's bark, are, however, far preferable; and especially for all tender exotic plants and fruits, which require an even degree of warmth to be continued for several months, which cannot be effected with horse-dung. The manner of making them is as follows: Dig a trench about three feet deep, if the ground be dry; but if wet, it must not be above a foot deep at most, and must be raised two feet above the ground. The length must be proportioned to the frames intended to cover the bed, but it should never be less than ten or twelve feet, and the width not less than six. The trench should be bricked up round the sides to the above height of three feet, and filled in the spring with fresh tanner's bark, that has been lately drawn out of the vat, and has lain in a round heap, for the moisture to drain out of it, only three or four days: as it is put in, gently beat it down equally with a dung-fork; but it must not be trodden, which would prevent its heating, by settling it too close: then put on the frame, covering it with glasses; and in about ten days or a fortnight, it will begin to heat; at which time plunge your pots of plants or seeds into it, observing not to tread down the bark in so doing. This bed will continue three or four months in a good temper of heat; and if you stir up the bark pretty deep, and mix a load or two of fresh bark with the old when you find the warmth decline, you will preserve its heat two or three months longer. Many lay some hot horse-dung in the bottom of the trench under the bark; but this ought never to be practised, unless the bed is wanted sooner than the bark would heat of itself, and even then there ought only to be a small quantity of dung at the bottom. The frames which cover these beds should be proportioned to the several plants they are designed to contain; if they be to protect the ananas or pine-apple, the back part should be three feet high, and the lower part fifteen inches: if the bed be intended for taller plants, the frame must be made of a depth proportionable to their height; but if it be for sowing seeds alone, the frame need not be above fourteen inches high at the back, and seven in

the front; by which means, the heat will be much greater.

HOTBRA'INED. *a.* (*hot* and *brain.*) Violent; vehement; furious (*Dryden*).

HO'TCHPOT. } *s.* (*hache en poché*, Fr.)
HO'TCHPOTCH. } A mingled hash; a mixture (*Camden. Bacon.*)

HOTCO'CKLES. *s.* (*hautes coquilles*, Fr.) A play in which one covers his eyes, and guesses who strikes him (*Arbuthnot*).

HOTEL, a French term, anciently signifying a house or dwelling-place; afterwards used for the palaces or houses of the king, princes, and great lords. Since the abolition of monarchy, however, this term has been more commonly applied to public buildings, hospitals, &c. In England, the word *Hotel* signifies a large inn or temporary lodging-house, ready-furnished.

HOTHEA'DED. *a.* (*hot* and *head.*) Vehement; violent; passionate (*Arbuthnot*).

HOT-HOUSE. In gardening, a building formed much upon the plan, and for the same purpose, as a green-house: but with a hot-bed of tan in its centre, instead of tressels and rows of plants in an ascending series; and warmed by a double stove to a considerably greater extent of heat, which should be seldom less than 70 of Fahrenheit, and equally maintained. Here are reared such exotics as the usual heat of the green-house is incapable of bringing to perfection; and as these are commonly of less height than green-house plants, the hot-house itself is considerably less lofty. Various methods have been lately devised for the purpose of warming both hot-houses and green-houses by the heat of the sun alone, or nearly so: but the principles are for the most part so operose, or the degree of care requisite so considerable, that the usual method of warming by flues, as described in the article Green-house, seems upon the whole superior to any other that has hitherto been proposed.

HO'TLY. *ad.* (from *hot.*) 1. With heat; not coldly. 2. Violently; vehemently (*Sidney*). 3. Lustfully (*Dryden*).

HOTMOU'THED. *a.* (*hot* and *mouth.*) Headstrong; ungovernable (*Dryden*).

HO'TNESS. *s.* (from *hot.*) Heat; violence; fury.

HO'TSPUR. *s.* (*hot* and *spur.*) 1. A man violent, passionate, precipitate, and heady (*Burton*). 2. A kind of pea of speedy growth (*Mort.*)

HO'TSPURRED. *a.* (from *hotspur.*) Vehement; rash; heady (*Peacham*).

HOTTENTOT CHERRY, in botany. See Chassine.

HOTTENTOTS (country of the). A large region in the south extremity of Africa, extending N. and W. from the Cape of Good Hope beyond the mouth of Orange River, and from that Cape in an E.N.E. direction, to the mouth of the Great Fish River, which parts it from Caffraria. It lies between the tropic of Capricorn and 35 S. lat. and is bounded on the W., S., and E., by the Atlantic, Southern, and Indian Oceans, and on the N. by regions very little if at all explored. The coast is mountainous, and abounds in bays and capes. There are no considerable kingdoms throughout this large extent of country, the whole being inhabited by different nations or tribes of Hottentots, governed by different honquers, or chiefs, who have no fixed residence; living, like the Arabs, in huts or portable houses, and removing their kraals, or villages, whenever the pasture becomes too bare for the subsistence of their cattle, and upon the natural or violent death of an inhabitant. The known nations are the Kochaquan, Suffaquan, Odiquan, Chirigriquan, Greater and Lesser Namaquan, Attaquan, Hessaquan, Sonquan, Dunquan, Damaquan, Gauros or Gouriquan, Houteniquan, Chamtover, and Heikom. They no longer compose, as formerly, one nation, uniform in their manners, customs, and pursuits. The establishment of the Dutch colony was a fatal epoch, which disunited them all, and occasioned those differences by which they are at present distinguished. In 1652, when Riebeck, the surgeon, on his return from India, opened the eyes of the directors of the company, respecting the importance of an establishment at the Cape, they wisely thought that such an enterprise could not be better executed than by the genius which had planned it. Furnished, therefore, with ample powers, and being supplied with provisions, and every thing that could contribute to the success of the project, Riebeck soon arrived at Table Bay. Like an able politician, and a skilful negociator, he employed every method in his power to secure the friendship of the Hottentots; and he covered with honey the edge of the poisoned bowl. Gained over by powerful allurements, these savages, the unlimited masters of all this part of Africa, did not perceive how many of their rights, and how much authority, repose, and happiness, this profanation deprived them of. Indolent by nature, and little addicted to agriculture, they were not uneasy that strangers should seize on a small corner of useless land, which was often uninhabited. They thought that whether a little farther, or a little nearer, it was of no importance where their flocks, the only riches worthy of engaging their attention, sought for their food, provided they could find it. The avaricious policy of the Dutch had great hopes from so peaceful a beginning; and did not fail to finish the work, by holding out two very seducing allurements to the Hottentots—tobacco and strong liquors. From that moment these unhappy savages bade adieu to their liberty, and to that spirit which mankind inherit from nature. Attracted by these two baits, they approached as near as they could to the source from which they received them; whilst the Dutch, who for a pipe of tobacco, or a glass of brandy, could procure an ox, paid every attention in their power to such valuable neighbours. The colony insensibly increasing, and acquiring more strength, that formidable power which dictated laws to all this part of Africa, and removed to a great distance every thing that attempted to oppose its eager ambition, was seen to rise on foundations that could no longer be shaken. The fame of its prosperity was soon spread, and drew thither every day a number of new settlers. It may be easily judged, that, according to the usual practice, founded upon a logic which destroys the laws of property, so sacred and so re-

spectable, the will of the stronger party was a sufficient title for it to extend its possessions. The Dutch seized indiscriminately, at several times, and even without having occasion for them, on all the lands which government, or individuals favoured by government, thought proper, or found convenient. The Hottentots, thus confined, pressed, and harassed on all sides, divided themselves, and pursued plans entirely opposite. Those who were still interested in the preservation of their flocks, penetrated among the mountains towards the north and north-east; but these were the fewer number. The rest, ruined by a few glasses of brandy, and a few rolls of tobacco, impoverished and stripped of every thing, did not think of quitting their country; but, absolutely renouncing their manners, as well as their ancient and happy condition, of which they have no remembrance at present, they basely sold their services to the whites, who eased themselves of the painful and multiplied labours requisite on their plantations, by laying them upon these unfortunate Hottentots, more and more degenerated and corrupted. A few paltry and miserable hordes have indeed established themselves, and live as they can, in different cantons of the colony; but they have not even the power of choosing their own chief. As they are in the district of government, and under its authority, the right of naming him belongs entirely to the governor. The person whom he chooses repairs to the town, and receives a large cane, the knob of which is copper: after which a crescent or gorget, formed of the same metal, upon which is engraven, in large letters, the word *capitein*, is put round his neck, as a badge of his dignity. From that moment his melancholy horde, which for a long time has lost its national name, assumes that of the new chief who has been set over it. They will then say, for example, The horde of captain Kees, &c. who becomes to the governor a new creature, a new spy, and a new slave, and, to his own countrymen, a new tyrant. The governor himself is never personally acquainted with those whom he appoints. It is generally the planter nearest the horde, who solicits and determines the nomination for one of his own creatures; because he trusts that a low person whom he has in this manner patronized, will not be ungrateful, and that he will have all his vassals ready at his service when necessity may require. Thus, without any preliminary information, and even without any regard to justice, a helpless and feeble horde are obliged to receive laws from a man often incapable of commanding them; and thus does the interest of one individual prevail over the general good, both in great and little affairs: and it is thus that the revolutions of a republic, and the puerile election of the syndic of a village, proceeding from the same principles, are equal and similar in their effects.—Such, in general, are the Hottentots known under the name of the Hottentots of the Cape, or Hottentots of the Colonies; but we must not confound with them the savage Hottentots, who, by way of derision, are called the Jackal-Hottentots; and who, far removed from the arbitrary Dutch government, still preserve in the desert which they inhabit all the purity of their primitive manners. Among the different tribes of Hottentots, the women wear two or three coverings formed of a skin, and fastened about their bodies like an apron; the outermost, which is the largest, measuring from seven inches to twelve. This is frequently adorned with glass beads in different forms. All these coverings are well smeared with grease. The garment usually worn for covering the men's bodies, is a sheep-skin with the wool. This pelisse, or kaross, is tied forward over the breast. If the weather is not cold, they let it hang loose over their shoulders, in a careless manner; when it reaches down to the calves of their legs, leaving the lower part of the breast, stomach, and fore part of the legs and thighs bare; but in rainy and cold weather they wrap it round them, so that the fore part of the body likewise is in some measure covered with it, as far as below the knees. That which is used by the women for the same purpose, does not differ from those used by the men in any other respect, than that the women have a peak to their karosses, which they turn up, forming with it a hood or little pouch, with the hairy side inwards. In this they carry their little children. The men in general wear no peculiar covering on their heads. Those who live nearest to the colonists, wear European hats, slouched all round. or else with one side turned up. The women frequently go bareheaded; when they cover their heads, it is with a cap in the form of a short truncated cone, without any seam, made of some animal's stomach; and as black as soot, mixed up with fat, can make it. Over this cap they sometimes wear another ornament, consisting of an oval wreath, made of buffalo's hide, with the brown hair outwards. Both the rims of this wreath (as well the lower one on which it rests, as the upper one) are always smooth and even; each of them set with a row of small shells, to the number of more than thirty, in such a manner, that, being placed quite close to each other, their beautiful white enamel, together with their mouths, is turned outwards. Neither the ears nor nose of the Hottenots are adorned with any pendant or other ornaments. The necks of the men are bare; but those of the women are decorated with a strip of undressed leather, upon which are strung eight or ten shells. Another ornament in use with both sexes, is rings on their arms and legs. Most of these rings are made of thick leather straps, generally cut in a circular shape, which, by being beat and held over the fire, are rendered tough enough to retain the curvature that is given them. It is these rings that, according to Sparman, have given rise to the almost universally received notion, that the Hottentots wrap guts about their legs, in order to eat them occasionally. The men wear from one to five or six of these rings on their arms, just above their wrist; but seldom on their legs. The matrons of a higher rank, frequently have a considerable number of them both on their arms and legs, especially the latter, so that they are covered with them from the feet up to their knees. These rings are of various thickness; being sometimes as thick as a goose-quill, and sometimes two or three times that size. Now and then they are made of pieces of leather forming one entire ring, so that the arms and feet must be put through them when the wearer wishes to put them on. Rings of iron and copper, and especially of brass, of the size of a goose-quill, are considered as more genteel and more valuable than those made of leather. They seldom wear any shoes. The Hottentots who live within the boundaries of the Dutch colonies, seldom make use of any weapons.

Here and there, indeed, a man will furnish himself with a javelin, by way of defence against the wolves: this is called *hassagai*. Their habitations are as simple as their dress, and equally adapted to the wandering pastoral life they lead in those parts. In fact, they scarcely merit any other name than that of huts; though they are sufficient for the Hottentot's wants and desires. Every hut is disposed in the following manner: They are of a circular form, resembling a round bee-hive or vault. The ground-plot is from eighteen to twenty-four feet in diameter. The highest of them are so low, that a middle-sized man can scarcely stand upright. From the situation of their fire-place, which is in the centre, the Hottentots have this advantage; that when they sit or lie in a circle round the fire, the whole company equally enjoy the benefit of its warmth. The door, which is low, is the only place that lets in the light; and at the same time the only outlet that is left for the smoke. The frame of this arched roof is composed of slender rods, or sprays of trees. These rods, being previously bent into a proper form, are laid, either whole or pieced, some parallel with each other, others crosswise; they are then strengthened by binding others round them, in a circular form, with withies. Large mats are then laid very neatly over this lattice-work, so as perfectly to cover the whole. The aperture which is left for the door, is closed, whenever there is occasion for it, with a skin fitted to it, or a piece of matting. These mats are made of a piece of cane or reed: the reeds, being laid parallel to each other, are fastened together with sinews or catguts; or else some kind of packthread, such as they have had an opportunity of procuring from Europeans. The order or distribution of these huts in a kraal, or clan, is most frequently in the form of a circle, with the doors inwards; by this means a kind of yard or court is formed, where the cattle are kept at night. The milk, as soon as taken from the cow, is put to other milk which is curdled, and is kept in a leather sack; of this the hairy side, being considered as the cleanest, is turned inwards: so that the milk is never drunk while it is sweet. Many falsehoods have been related of this people, which seem to have originated in the prejudices and misrepresentations of the planters, to which Kolben, as well as other travellers since his time, seem to have given too easy faith. Vaillant, who certainly had the best opportunities of being acquainted with them, from learning their language and living among them, speaks of them with a degree of affection. Some authors have said that the families of the savages sleep promiscuously in the same hut; and are neither acquainted with difference of age, nor that invincible horror which separates persons of different sexes connected by blood. The savages indeed, confined to what is strictly necessary, have never thought of preserving, under an apparent decency, all the turpitude of unnatural inclinations; and different apartments for brother and sister, mother and son, are not to be found among them: but to conclude because they have only one habitation, one bed, and one mat to repose on, after the labours of the day, that they live like the brutes, would be to calumniate innocence, and offer an insult to nature. Vaillant says, he visited more than one horde of savages, and always found modesty and reserve amongst the women, and amongst the men also. He thinks that the women of savage nations, once visited by corrupted Europeans, and too well acquainted with their perverse inclinations, prostitute themselves to all those who choose to enjoy them, and gratify their taste, from a dread of the barbarous cruelties which the whites are capable of committing.—There is something peculiar in the features of the Hottentot, which, in a certain degree, separates him from the generality of mankind. His cheek bones are exceedingly prominent, so that his face being very broad in that part, and the jaw-bones, on the contrary, extremely narrow, his visage continues decreasing even to the point of the chin. This configuration gives him an air of lankness, which makes his head appear very much disproportioned, and too small for his full and plump body. His flat nose rises scarcely half an inch at its highest elevation; and his nostrils, which are excessively wide, often exceed in height the ridge of his nose. His mouth is large; and furnished with small teeth, well enamelled, and perfectly white: his eyes, very beautiful and open, incline a little towards the nose, like those of the Chinese: and to the sight and touch his hair has the resemblance of wool; it is very short, curls naturally, and in colour is as black as ebony. He has very little hair, yet he employs no small care to pull out by the roots part of what he has; but the natural thinness of his eye-brows saves him from this trouble in that part. Though he has no beard but upon the upper lip, below the nose, and at the extremity of the chin, he never fails to pluck it out as soon as it appears. This gives him an effeminate look, which, joined to the natural mildness of his character, destroys that commanding fierceness common to all men in a state of nature, and which has acquired them the proud title of kings. With regard to proportion of body, a Hottentot is as perfect as if cast in a mould. His gait is graceful and agile; and all his motions, which are easy, seem very different from those of the American savages. The women, with more delicacy of features, exhibit the same characteristic marks in their figure: they are equally well made. Their breasts, admirably placed, have a most beautiful form, while in the bloom of youth: their hands are small; and their feet extremely well shaped, though they never wear sandals. The sound of their voice is soft; and their speech passing through the throat, is not destitute of harmony. When they speak, they employ a great many gestures, which give power and gracefulness to their arms. The Hottentots, being naturally timid, are consequently not at all an enterprising people. Their phlegmatic coolness, and their serious looks, give them an air of reserve, which they never lay aside, even at the most joyful moments; while, on the contrary, all other black or tawny nations give themselves up to pleasure with the liveliest joy, and without any restraint. A profound indifference to the affairs of life, inclines them very much to inactivity and indolence: the keeping of their flocks, and the care of procuring a subsistence, are the only objects that occupy their thoughts. They never follow hunting as sportsmen, but like people oppressed and tormented by hunger. In short, forgetting the past, and being under no uneasiness for the future, they are struck only with the present; and it is that alone which engages their

attention. They are, however, the best, the kindest, and the most hospitable, of people. Whoever travels among them may be assured of finding food and lodging; and though they will receive presents, yet they never ask for any thing. If the traveller has a long journey to accomplish, and if they learn from the information he requires, that there are no hopes of his soon meeting with other hordes, that which he is going to quit supplies him with provisions, as far as their circumstances will allow, and with every thing else necessary for his continuing his journey, and reaching the place of his destination. 'Before the arrival of the Europeans at the Cape, the Hottentots were not acquainted with commerce, and, perhaps, they had no idea even of barter; but, on the appearance of tobacco and toys, they were soon initiated into a part of the mercantile mysteries. These objects, which at first were only agreeable novelties, by length of time have become wants. When these articles grow scarce among them, they are supplied by the Hottentots of the colonies; for it is proper to observe, that however eager they may be to get such trifles into their possession, they do not take the trouble to go one step in search of them themselves, but choose rather to do without them.—The Hottentots are represented as a miserable and poor nation, superstitious, ferocious, indolent, and excessively dirty; in a word, they are vilified in every possible manner. That they besmear themselves with grease is a fact; but then it must be considered that all these savages, without exception, are excellent swimmers, and perhaps the best divers in the world; and the practice of bathing, which they use several times a day, can leave little power to ointments, or even to dust, to spoil and corrode the skin. The continual care and attention bestowed by the Gonaquas in particular, on their dress, sufficiently prove that they are fond of cleanliness: all, therefore that can be said is, that it is ill understood; and even before we proceed so far it might be necessary to enquire whether they are not obliged to grease themselves in this manner, either on account of the temperature of the climate, or from a want of those resources which nature has not pointed out to them. Their clothes, indeed, are only the spoils taken from savage animals; but they do not neglect, as some have pretended, to clean and prepare these before they employ them for making dresses. A Hottentot is neither poor nor miserable; because, his desires never exceeding his knowledge, which is very limited, he never feels the spur of necessity. The language, notwithstanding its singularity, and the difficulty of pronouncing it, is, however, to be acquired by an European: according to M. Vaillant, it is more difficult to a Frenchman than to a Dutchman or German.—There is a species of Hottentots, who have got the name of Boshies-men, from dwelling in woody or mountainous places. These, particularly such as live towards the north-east, are direct enemies to the pastoral life. They subsist by hunting and plunder, and never keep any animal alive for the space of one night. By these means they render themselves odious to the planters, and are pursued and exterminated like wild beasts; or taken alive, and made slaves of.—The animals of this country are nearly similar to those of the other parts of Africa. Among the quadrupeds are the lion, elephant, hippopotamus, buffalo, the double-horned rhinoceros, panther, giraffe, or camelopardalis, elk, antelope, springbak, and gazel.

HOTTO'NIA. Feather-foil. In botany a genus of the class pentandria, order monogynia. Coral salver-shaped; stamens inserted in the throat, opposite the lobes; capsule one-celled; stigma globular; calyx five-parted. Four species: three, natives of India; one, H. palustris, with peduncled flowers in whorls, common to the marshes of our own country.

HOUBRAKEN (Arnold), a Dutch painter, born at Dort, in 1660. He also applied to literature, particularly to poetry, convinced of the advantage which he should thereby acquire in the line of his profession. He wrote the Lives of the Flemish Painters, printed in 1754, in 3 vols. folio.

HOUDAIN, a town of France, in the department of the Straits of Calais. Lat. 50. 39 N. Long. 2. 34 E.

HOVE, the preterit of *heave*.

HOVEDON (Roger de), an English historian in the time of Henry II. He was a native of York, and was at the same time an ecclesiastic and a lawyer, two professions then commonly united in the same person. His Annals of English History commence at 731, and end with the third year of John. They were printed at London in 1595, and at Frankfort in 1601.

HO'VEL. *s.* (diminutive of hoꝼe, house, Saxon.) 1. A shed open on the sides and covered over head (*Tusser*). 2. A mean habitation; a cottage (*Ray*).

To Ho'vel. *v. a.* (from the noun.) To shelter in a hovel (*Shakspeare*).

HOVELLING, in architecture, is a method of working up the sides of a chimney, and covering the top with tiles or bricks, set up in a pyramidical form, so that the smoke may escape below the current, when the wind makes over the chimney, or against any one side of it.

HOVEN. part. pass. (from *heave*.) Raised; swelled; tumefied (*Tusser*).

HOVENIA, in botany, a genus of the class pentandria, order monogynia. Calyx five-parted; corol five-petalled; stigmas three; capsule three-celled, three-valved; the cells one-seeded. One species; a Japan tree, with coymbed, terminal, axillary flowers, and thick, fleshy, sweet peduncles, which are eaten by the Japanese.

To HO'VER. *v. n.* (*hovio*, to hang over, Welsh.) 1. To hang in the air overhead, without flying off one way or other (*Prior*). 2. To stand in suspense or expectation (*Sp.*). 3. To wander about one place (*Addison*).

HOUGH, *s.* (hoȝ, Saxon.) 1. The lower part of the thigh (*Esdras*). 2. (*huë*, French.) An adz; a hoe (*Stilling.*).

To HOUGH, *v. a.* (from the noun). 1. To hamstring; to disable by cutting the sinews of the ham (*Joshua*). 2. To cut up with a hough or hoe.

Hough (John), an excellent English bishop, was born in Middlesex, in 1650. After going through his school-education, he was removed to Magdalen college, Oxford, of which, in 1675, he was elected fellow. In 1681, he accompanied the duke of Ormond to Ireland, from whence he returned to England the year following, and in 1685 was made prebend of Worcester. In 1687, he was chosen by the fellows president of Magdalen college; from which he was removed by the ecclesiastical commissioners, and Parker, bishop of Oxford, put in his place. At the Revolution, however, the college recovered its rights, and Hough his presidentship. In 1690, he was mad· bishop of Oxford, from whence, in 1699, he was translated to Litchfield and Coventry. On the death of Dr. Tenison he was offered the primacy, but declined it. However, in 1717, he accepted the see of Worcester, which he held to his death in 1743. He was a very munificent prelate, and expended on his episcopal palaces at least 7000l.

Hough, bony, among farriers, a term formerly used to signify an enlargement of the cap of a horse's hock; whether it were only a thickening of the integument, generally termed a callosity, or an ossification just below it. The phrase, however, is now become obsolete; and is expressed by blood spavin, bone spavin, or curb, as the case may happen to be.

HOULET. *s.* The vulgar name for an owl.

HOULSWORTHY. See Holdsworthy.

HOULT. *s.* (holt, Saxon.) A small wood.

HOUND. See Canis, and Hunting.

Hounds for the chase, among sportsmen: are of four descriptions; Stag-hounds, Fox-hounds, Harriers, and Beagles: much concerning which will be found under these articles separately, so far as relates to separate training or design. What we shall here chiefly observe will relate to them generally, and embrace the whole. There are necessary points then in the shape of a hound, of whatever description, which ought always to be attended to; for if he be not of a perfect symmetry, he will neither run fast, nor bear much work: he has much to undergo, and should have strength proportioned to it. Let his legs be as straight as arrows; his feet round, and not too large; his shoulders back; his breast rather wide than narrow; his chest deep; his back broad; his head small; broad; his neck thin; his tail thick and brushy; and if he carry it well, so much the better.

Next to the consideration of individual symmetry, should follow a corresponding uniformity of the whole. A pack, to be handsome, should vary little or not at all in height, and have a pleasing affinity to each other in colour: to be good, they should run well together; and the pitch of their tongues should be in unison, without a single note of discord. When sufficient time has been employed in forming a pack of hounds, they can never be considered in a state of excellence, unless they go as if they were in harness; that is, when they are running breast-high, unless they run nearly all abreast; or, in other words, when clear of covert, and crossing a country, unless the whole pack might nearly be covered with a sheet.

Nothing is a greater disgrace to the master, the huntsman, or the pack, than to see a parcel of straggling tail hounds, labouring in vain; except to behold a poor tortured leading hound loaded with a leaden necklace, to restrain his speed, and depress the instinctive impulse of his nature in order to bring him upon a level with those who are not his equals. This is a truly unsportsman-like stretch of authority, very closely bordering upon cruelty. Hounds of either description had better be parted with, than suffered to encounter such a mortification; and both evils will be the less likely to happen, the more moderate the number admitted to the field. The taking out too many hounds is a frequent error, always productive of trouble, and sometimes of a most vexatious diminution of sport, as well as of incessant worry to the exhausted whipper-in.

Hounds differ much in their properties, according to the crosses in their blood. The delight of the old southern hound is to dwell upon the scent; the extatic eagerness of the harrier or north country beagle is to press it before him. When hounds of the former breed come to a fault, and can carry the scent no farther, they stick their noses to the ground as close together as a swarm of bees, making few or no efforts of their own, unless lifted along by the helping hand and encouraging voice of the huntsman. The dash of the latter is instantaneous and indefatigable; they make their cast in different directions, without a moment's pause, and each becomes a rival of every other.

Opposite as these two kinds of chases must necessarily be, each has its votaries. The sedate, the aged, and infirm, give a constant preference to the southern hound; but to those in the health and pride of manhood, who enjoy the obstacles, and surmount the difficulties, of crossing a country, fleet hounds will always offer a superior attraction. Yet the mischief is, that we have carried the point of speed too far of late years, not merely in harriers but even in fox-hounds. Hence, in the earlier part of the season, half the hares found are run up to on the first view; and even after Christmas, when they are supposed to get strong, average chases do not exceed from twenty minutes to half an hour; while the fox chase itself is contracted in proportion.

The spring months are the best in which puppies can be produced; they have then the whole summer to grow in. Antecedently to copulation, much attention should be paid to the shape, size, colour, disposition, and

qualification, of both the dog and bitch intended to breed from. The sportsman should on no account breed from a dog that is not stout, that is not tender-nosed, or that is either a babbler or a skirter. It is the judicious cross, however, that makes the pack complete. The faults and imperfections in one breed, may be rectified in another; and if this be properly attended to, no reason can be suggested, why the breeding of hounds may not improve, till improvement can go no further.

The dog and bitch employed should be strong and healthy: old dogs should never be put to old bitches; and good whelps should never be put to bad walks: stinted in their earliest growth, by a want of proper nutriment, the frame becomes impoverished, the loins weak, and they are the less able to encounter that terrible foe, the distemper, whenever it may make its attack. Various are the opinions respecting the number of hounds it may be necessary to keep in kennel during the hunting season; this, however, should seem to be best regulated by the kind of country they have to hunt, as one sort of soil may tire or lame hounds much more than another: slippery, marly clay, will do the one; the rolling flints of Surry, Oxfordshire, or Hampshire, never fail to do the other. Those who are prudent, will never take more than from twenty to five-and-twenty couple to the field; to exceed which, would not only be rather unfair, but probably do more harm than good. The number necessary to be taken, however, is not so material a matter of consideration, as the conjunctive qualifications of the hounds when in the field; thirty-five couple of settled, steady, seasoned hounds, will admit of hunting three (occasionally four) days a week.

Every kennel should have a proper annual supply of young hounds; if this be neglected for two or three seasons, the pack will soon be overloaded with old hounds, and fall into an irretrievable decay. Industrious, hard-working hounds, seldom continue in full vigour and speed longer than five or six seasons; though there are not wanting instances of their having led the pack for eight or nine years. From eight to twelve couple of young hounds, bred annually, will sufficiently supply an establishment not exceeding forty couple; but it is always best to have a reserve of a few couple more than are wanted, in case of accident.

The chief diseases to which hounds are subject are madness, distemper, and mange; for which see the articles Mange, Distemper, Rabies, and Hydrophobia.

Hound-fish, in ichthyology. See Squalus.

Hound's-tongue, in botany. See Cynogloss.

To Hound. *v. a.* (from the noun.) 1. To set on the chase (*Bramhall*). 2. To hunt; to pursue (*L'Estrange*).

HOUNSLOW, a town in Middlesex, with a market on Thursdays. It is situated on the edge of a heath of the same name, on which are some powder-mills, on a branch of the river Coln. Hounslow is ten miles W. by S. of London.

HOUP. *s.* (upupa, Lat.) The pee-wit (*Ains.*)

HOU-QUANG, a province of China, occupying nearly the centre of the empire: the river Yang-tsekiang traverses it from west to east; and divides it into two parts, the northern and southern. This province (the greater part of which is level, and watered by lakes, canals, and rivers) is celebrated for its fertility: the Chinese call it the store-house of the empire; and it is a common saying among them, that "the abundance of Kiang-si could furnish all China with a breakfast; but the province of Hou-quang alone could supply enough to maintain all its inhabitants." Some princes of the race of Hong-vou formerly resided in this province; but that family was entirely destroyed by the Tartars when they conquered China.

HOUR, in chronology, an aliquot part of a natural day, usually a 24th, but sometimes a 12th. The origin of the word *hora*, or ὥρα, is, according to some authors, from a surname of the sun, the father of hours, whom the Egyptians call *Horus*. Others derive it from the Greek ὁρίζειν, to *terminate*, *distinguish*, &c. An hour, with us, is a measure or quantity of time, equal to a 24th part of the natural day, or nycthemeron; or the duration of the 24th part of the earth's diurnal rotation. Fifteen degrees of the equator answer to an hour; though not precisely, but near enough for common use. It is divided into 60 minutes; the minute into 60 seconds, &c. The division of the day into hours is very ancient: as is shewn by Kircher, *Oedipt. Ægypt.* tom. ii. part ii. class vii. c. 8. though the passages he quotes from Scripture do not prove it. The most ancient hour is that of the 12th part of the day. Herodotus, lib. ii. observes that the Greeks learned from the Egyptians, among other things, the method of dividing the day into twelve parts. The astronomers of Cathaya, &c. bishop Beveridge observes, still retain this division.

Hours, Jewish, or Ancient, are twelfth parts of the artificial day, or of the night. Hence, as it is only at the time of the equinoxes that the artificial day is equal to the night, it is then only that the hours of the day are equal to those of the night, or to the 24th part of the natural day. From the vernal to the autumnal equinox, the hours of the day exceed those of the night; but during the interval between the autumnal and vernal equinoxes, the hours of the night are longer than those of the day. It is, therefore, manifest, that when it is said, the *third* hour was about *nine* in the morning, and the *ninth* about *three* in the afternoon, this is not to be understood as rigorously

exact. The *third* hour was the middle time between *sun-rising* and noon; which, if the sun rose at *five*, was *half an hour after eight*; if at *seven*, was *half an hour after nine*, &c. The chief hours of prayer were the third and the ninth; at which seasons, the morning and evening sacrifices were offered, and incense burnt on the golden altar. Joseph. Antiq. Jud. lib. xiv. cap. 4. (al. 8.) § 3.

The following Table exhibits the time of the sun-rising and setting, and the length of the Jewish hour, both of day and night; as calculated for about the middle of every Jewish month, and the latitude of Jerusalem:

Names of the Months.	Sun rises.		Sun sets.		Length of the Hour			
					of day.		of night	
	h.	m.	h.	m.	h.	m.	h.	m.
Nisan, or Abib,	5	46	6	14	1		0	58
Ijar, or Zif,	5	20	6	40	1	7	0	53
Sivan,	5	0	7	0	1	10	0	50
Thamuz,	4	56	7	4	1	11	0	49
Ab,	5	10	6	50	1	8	0	.52
Elul,	5	36	6	24	1	4	0	56
Tisri, or Ethanim,	6	6	5	54	0	59	1	1
Marchewan or Bul,	6	34	5	26	0	54	1	6
Chisleu,	6	55	5	5	0	51	1	9
Tebeth,	7	0	5	0	0	50	1	10
Shebat,	6	42	5	18	0	53	1	7
Adar,	6	16	5	44	0	57	1	3

HOURS, PLANETARY, in astrology, are, like the Jewish hours, 12th parts of the artificial day or night. The astrologers pretend that a fresh planet comes to predominate every hour; and that the day takes its denomination from that which predominates the first hour thereof: as Monday, from the moon, &c.

HOUR-CIRCLES, are great circles, meeting in the poles of the globe, and crossing the equator at right angles. They are drawn through every 15th degree of the equinoctial or equator, each answering to an hour.

HOUR-GLASS, a popular kind of chronometer or clepsydra, serving to measure time by the descent or running of sand, water, &c. out of one glass vessel into another. The best, it is said, are such as, instead of sand, have egg-shells, well dried in the oven, then beaten fine and sifted.

HOUR-LINES on a dial, are lines which arise from the intersections of the plane of the dial, with the several planes of the hour-circles of the sphere.

HO'URLY. *a.* (from *hour.*) Happening or done every hour; frequent, often repeated (*Dryden*).

HO'URLY. *ad.* Every hour; frequently (*Dryden*).

HO'URPLATE. *s.* (*hour* and *plate.*) The dial; the plate on which the hours, pointed by the hand of a clock, are inscribed. (*Locke*).

HOUSE, habitation; a place built with conveniences to live in; or a building wherein to shelter a man's person and goods from the inclemencies of the weather, and the injuries of ill-disposed persons.

We say a brick house, a stone house, a house of two stories, of three stories, a manor house, a farm house, &c.

Amongst the Jews, Greeks, and Romans, houses were flat at top, so that persons might walk upon them; and usually had stairs on the outside, by which they might ascend and descend without coming into the house. Each house, in fact, was so laid out, that it inclosed a quadrangular area or court. This court was exposed to the weather, and, being open to the sky, gave light to the house. This was the place where company was received, and for that purpose it was strewed with mats or carpets for their better accommodation. It was paved with marble or other materials, according to the owner's ability, and provided with an umbrella of vellum to shelter them from the heat and inclemencies of the weather. This part of their houses, called by the Romans *impluvium*, or *cava ædium*, was provided with channels to carry off the water into the common sewers. The top of the house was level, and covered with a strong plaster by way of terrace. Hither, especially amongst the Jews, it was customary to retire for meditation, private converse, devotion, or the enjoyment of the evening breezes.

The Grecian houses were usually divided into two parts, in which the men and women had distinct mansions assigned them. That assigned to the men was towards the gate, and called Ἀνδρωνῖτις; the apartment of the women was the farthest part of the house, and called Γυναικωνῖτις. Jews, Greeks, and Romans, supposed their houses to be polluted by dead bodies, and to stand in need of purification.

A house should not be too low-seated, since this precludes the convenience of cellars. If you cannot avoid building on low grounds, set the first floor above the ground the higher, to supply what you want to sink in your cellar in the ground; for in such low and moist grounds, it conduces much to the dryness and healthiness of the air to have cellars under the house, so that the floors be good, and cieled underneath. Houses built too high, in places obvious to the winds, and not well defended by hills or trees, require more materials to build them, and more also of reparations to maintain them; and they are not so commodious to the inhabitants as the lower-built houses, which may be erected at a

much easier rate, and also as complete and beautiful as the other.

In buildings or houses not above two stories with the ground-room, and not exceeding twenty feet to the raison-place, and upon a good foundation, the length of two bricks, or eighteen inches, for the heading course, will be sufficient for the ground work of any common structure; and six or seven courses above the earth to a water-table, where the thickness of the walls is abated, or taken in, on either side, the thickness of a brick, namely, two inches and a quarter.

For large and high houses, or buildings of three, four, or five stories with the garrets, the walls of such edifices ought to be from the foundation to the first water-table three heading-courses of brick, or twenty-eight inches at least; and at every story a water-table, or taking in on the inside for the summers, girders, and joints, to rest upon, laid into the middle, or one quarter of the wall at least, for the better bond. But as for the innermost or partition wall, a half brick will be sufficiently thick; and for the upper stories, nine inches, or a brick-length, will suffice.

There are four different rates into which the proportions of houses in town are divided or classed by the legislature. The first rate, or houses of the largest size, are such as exceed nine squares of building; those of the second rate are from five to nine squares; those of the third from three and a half to five squares; and of the fourth, not exceeding three squares and a half. Their height is regulated in like manner, and the thickness of their walls and chimneys. With such restrictions the architect must often proceed under great disadvantages, and must occasionally call forth the good quality of docility recommended by Vitruvius.

We cannot multiply rules for the different parts of a house; since these must be modified by a variety of circumstances, in which the skill and judgment of the architect must direct: but we shall conclude this article with expressing a wish that contrivers of buildings would avail themselves more of an important modern discovery in natural history, viz, the superior levity of infectious and unwholesome air. The upper sashes in most houses are too frequently immoveable; in consequence of which, no part of the foul air above the level of the lowest rail of the other sashes' greatest rise can escape by the window; and if it escapes by the doors, it is generally for want of a vent in the highest part of the roof, merely to accumulate in the upper story of the house, and add to the infection which the great quantities of old furniture usually stored up there are of themselves too apt to create. Thus the chief advantage to be expected from lofty rooms is in a measure lost; whereas, were the upper sashes contrived so as to draw down, all the air might be easily changed, and that almost insensibly, by letting them down an inch or two. Nay, the upper sash might be often let down entirely, with less danger or inconvenience from cold, than the lower thrown up the tenth part of an inch; though the doing of the former would be infinitely the most beneficial. It is perhaps on this principle that we are to account for the good health enjoyed by the poor who live crowded in damp cellars, and often with great numbers of rabbits, poultry, and even swine, about them. These cellars are open to the street, with doors reaching from the floor to the very ceiling, but never so close at bottom or at top as to prevent a free circulation of air; in consequence of which, that all-vivified fluid, as fast as it is spoiled by passing through the lungs of the inhabitants and their stock, or is infected by their insensible perspiration, excrements, &c. is driven out, and replaced by the fresh air.

House is used for one of the estates of the kingdom of Britain assembled in parliament. Thus we say, the house of lords, the house of commons, &c. See Peers, Commons, &c.

House is also used for a noble family, or a race of illustrious persons issued from the same stock. In this sense we say, the house or family of the Stuarts, of the Bourbons, &c.

House, in astrology, denotes the twelfth part of the heavens. The division of the heavens into houses, is founded upon the pretended influence of the stars, when meeting in them, on all sublunary bodies. These influences are supposed to be good or bad; and to each of these houses particular virtues are assigned, on which astrologers prepare and form a judgment of their horoscopes. The horizon and meridian are two circles of celestial houses, which divide the heavens into four equal parts, each containing three houses, six of which are above the horizon and six below it; and six of these are called eastern and six western houses.

Country-House is the *villa* of the ancient Romans (see Villa), the *quinta* of the Spaniards and Portuguese, the *closerie* and *cassine* of the French, and the *vigna* of the Italians. 1. It ought always to have wood and water near it; these being the principal beauties of a rural seat. The trees make a far better defence than hills; as they yield a cooling and healthy air, shade during the heat of summer, and very much break the severities of the winter season. 2. It should not be situated too low, on account of the moisture of the air; and, on the other hand, those built on places exposed to the wind are expensive to keep in repair.

To House. *v. a.* (from the noun.) 1. To harbour; to admit to residence (*Dryden*).

2. To shelter; to keep under a roof (*Evelyn.*)

To House. *v. n.* 1. To take shelter; to keep abode; to reside (*Shakspeare*). 2. To have an astrological station in the heavens (*Dryden*).

Ice-House. See Ice.

House, *town*, or *hall*, is a place where the officers and magistrates of a town or city hold their meetings, for the due administration of their laws and policy. See Hall, and Guild.

House, *work*. See Work-house and Bridewell.

House *of Correction* is for the punishing of idle and disorderly persons, parents of bastard children, beggars, servants running away, trespassers, rogues, vagabonds, &c. Poor persons refusing to work, are there to be whipped, and set to work and labour; and any person who lives extravagantly, having no visible way to support himself, may be sent to the *house of correction*.

House *and Window Tax*, a branch of the king's extraordinary revenue. Tables of the different rates of duty upon houses and windows are given in Kearsley's Tax Tables, published annually: to these we refer for minutiæ. The clauses relative to the house-tax are, 1. That offices, yards, gardens, coach-houses, brew-houses, wood-houses, wash-houses, &c. provided they all stand within the compass of one acre, belonging to the dwelling-house, must be valued with the dwelling house, and be liable to the same duties. 2. Shops and warehouses are also liable, if attached to the dwelling-house; except those of wharfingers. 3. No warehouse that is a distinct building is liable. 4. No house to be deemed occupied, when one person is only left in charge of it. 5. Where houses are let in tenements, the landlord must pay the duty. 6. Halls and offices that pay other taxes are liable to this. 7. Farm-houses used only for husbandry, under 10*l.* per annum, are not chargeable; nor houses for the reception of the poor, or if not occupied by the owner or rented by a tenant. 19 *Geo.* 3. c. 15.

HO'USEBREAKER. *s.* (*house* and *break*). Burglar; one who makes his way into houses to steal (*L'Estrange*).

HOUSE-BREAKING, or robbing, is the breaking into and robbing a house in the day-time; the same crime being termed burglary when done by night: both are felony without benefit of clergy.

HO'USEDOG. *s.* (*house* and *dog*). A mastiff kept to guard the house. (*Addison*).

HO'USEHOLD. *s.* (*house* and *hold*). 1. A family living together (*Swift*). 2. Family life; domestic management (*Shakspeare*). 3. It is used in the manner of an adjective, to signify domestic; belonging to the family; as, *household* affairs (*Swift*).

HO'USEHOLDER. *s.* (from *household*). Master of a family (*Matthew*).

HO'USEHOLDSTUFF. *s.* (*household* and *stuff*). Furniture of a house; utensils convenient for a family (*L'Estrange*).

HO'USEKEEPER. *s.* (*house* and *keep*). 1. Householder; master of a family (*Locke*). 2. One who lives in plenty (*Wotton*). 3. One who lives much at home. (*Shaks.*). 4. A woman servant that has care of a family, and superintends the servants. (*Swift*). 5. A housedog; not in use (*Shakspeare*).

HO'USEKEEPING. *a.* (*house* and *keep*). Domestic; useful to a family. (*Carew*).

Ho'usekeeping. *s.* Hospitality; liberal and plentiful table. (*Prior*).

HO'USEL. *s.* (*hunsel*, Gothic, a sacrifice). The holy eucharist: obsolete.

To Ho'usel. *v. a.* (from the noun). To give or receive the eucharist: obsolete.

HOUSE-LEEK. See Sempervivum.

——— *lesser*. See Sedum.

Ho'useleek. *s.* (*house* and *leek*). A plant.

HO'USELESS. *a.* (from *house*). Wanting abode; wanting habitation (*West*).

HO'USEMAID. *s.* (*house* and *maid*). A maid employed to keep the house clean (*Swift*).

HOUSEMAN (Cornelius), a painter, born at Antwerp in 1648. He settled at Mechlin, where he acquired great reputation as an artist. He excelled in painting landscapes enriched with the figures of animals and plants, executed in a beautiful manner. He died in 1727.

HO'USEROOM. *s.* (*house* and *room*). Place in a house (*Dryden*).

HO'USEWARMING. *s.* (*house* and *warm*). A feast or merrymaking upon going into a new house.

HO'USEWIFE. *s. house* and *wife*). 1. The mistress of a family (*Pope*). 2. A female economist (*Spenser*). 3. One skilled in female business. (*Addison*).

HO'USEWIFELY. *ad.* (from *housewife*). With the economy of a careful woman.

HO'USEWIFERY. *a.* (from *housewife*). Skilled in the acts becoming a housewife.

Ho'usewifery. *s.* (from *housewife*). 1. Domestic or female business; management becoming the mistress of a family. (*Chapman*). 2. Female economy. (*Taylor*).

HO'USING. *s.* (from *house*).

1. Quantity of inhabited building. (*Graunt*). 2. (from *houseaux*, French). Cloth originally used to keep off dirt, now added to saddles as ornaments.

Housing, among bricklayers, a term used for a brick which is warped, or is cast crooked or hollow in burning; in such a case they say, it is housing.

Housing, in the manage, a covering laid over the saddle of a horse to preserve it from injury.

Housings, military, are ornamental coverings appertaining to officers of cavalry in general, and even to the privates of the king's horse-guards. They usually consist of scarlet trappings adorned with gold lace,

fringe, and some part of the insignia of the crown. They are fastened to the hinder part of the saddle, and suspended from the loins, so as to cover the flanks, and a portion of the hind-quarters on each side. General and field officers have their housings commonly made of lions', tigers', or leopards' skins, giving additional magnificence to the grandeur of the military charger.

HO'USLING. *a.* (from *house.*) Provided for entertainment at first entrance into a house; housewarming (*Spenser*).

HOUSS. *s.* (from *houseaux*, Fr.) Housings.

HOUSTO'NIA, in botany, a genus of the class tetrandria, order monogynia: corol one-petalled, funnel-form; capsule two-celled, two-seeded, superior. Four species, American shrubs, chiefly with scarlet or deep-red flowers.

HOU-TCHEOU-FOU, a city of China, in the province of Tche-kiang. It is a city of the first class; and is situated on a lake, from whence it takes its name. The quantity of silk manufactured here is almost incredible. To give some idea of it, we shall only say, that the tribute paid by a city under its jurisdiction, named *Te-tsin-hien*, amounts to more than 500,000 ounces of silver. Its district contains seven cities. Lat. 30. 35 N. Long. 119. 45 E.

HOUTHUYNIA, in botany, a genus of the class heptandria; order monogynia. Spathe four-leaved; spadix covered with florets; calyxless; corolless: capsule uncertain. One species, a polygonous herb of Japan.

HOW. *ad.* (hu, Saxon). 1. To what degree (*Boyle*). 2. In what manner (*L'Estrange*). 3. For what reason; from what cause (*Shakspeare*). 4. By what means (*Bacon*). 5. In what state. (*Dryden*). 6. It is used in a sense marking proportion or correspondence: *by* how *much a man is wiser, by so much he should be better.* (*Hayward*). 7. It is much used in exclamation: *and then he talked, ye gods,* how *he would talk!*

HOWARD (Henry), earl of Surry, a soldier and poet, the son and grandson of two lord-treasurers, dukes of Norfolk, was born probably about the year 1520, and educated in Windsor Castle, with young Fitzroy, earl of Richmond, natural son to king Henry VIII. Wood says, from tradition, that he was some time a student at Cardinal college, Oxford. In his youth he became enamoured of the fair Geraldine, whom his sonnets have immortalized. He fell a victim, as our English history relates, to the jealousy of the Seymours, who, being rivals of the Norfolk family, and in favour with king Henry VIII. accused him of aspiring to the crown. Surry, and his father the duke of Norfolk, were committed to the Tower, in December 1546; and on the 13th of January following, the former was tried at Guildhall by a common jury, and beheaded on Tower-hill on the 19th, nine days before the death of the king himself; who thus, that the measure of his crimes might be full, finished his life with the murder of his best subject. The accusations brought against this amiable and innocent young nobleman on his trial, were so extremely ridiculous, that one is astonished how it was possible, even in the most despotic reign, to find a judge and jury so pusillanimously villainous as to carry on the farce of justice on the occasion. Lord Surry was first interred in the church of All-hallows Barking, near Tower-hill; and afterwards, in the reign of king James I. his body was removed to Farmingham in Suffolk, by his son Henry, earl of Northampton.

As to the character of this unfortunate earl, all our poets have sung his praise. Mr. Walpole begins his anecdotes of Surry with these words: "We now emerge from the twilight of learning to an almost classic author; that ornament of a boisterous, yet not unpolished court, the earl of Surry, celebrated by Drayton, Dryden, Fenton, Pope, illustrated by his own muse, and lamented for his unhappy death: a man (as Sir Walter Raleigh says) no less valiant than learned, and of excellent hopes." Leland calls him the conscript enrolled heir of Sir Thomas Wyatt the elder, in his learning and other excellent qualities; and the author of the Art of English Poetry says, that the earl of Surry, and Sir Thomas Wyatt, may be justly called the reformers of our poetry and style. His poems were published in 1557, 12mo.; and in 1565, 1574, 1585, 1587, 8vo. Several of the sonnets are by Sir Thomas Wyatt and others.

Howard (John), the philanthropist, was born at Hackney in 1726. His father, who kept a carpet-warehouse in London, dying, left him in the hands of guardians, by whom he was apprenticed to a wholesale grocer. But his constitution being too weak for trade, he bought out the remainder of his time, and made a tour on the continent. On his return he lodged at the house of a widow lady at Stoke Newington, who nursed him with such care during his illness, that he conceived an affection for her, though she was much older than himself, and they were married. Mrs. Howard lived only about three years after, and he was a sincere mourner for her loss. In 1756 he embarked for Lisbon, but on the passage the ship was taken and carried into France. After his release he made the tour of Italy, and on his return to England he settled in Hampshire. In 1758 he married a second wife, but she died in child-bed in 1765, leaving him one son. He was at this time fixed at Cardington near Bedford, where he had purchased a seat adjoining that of his relation Mr. Whitbread. During his residence here he was a constant attendant at a dissenting meeting-house, at Bedford, of which the Rev. Mr. Smith was pastor. This gentleman always spoke of Mr. Howard's private character in terms of the highest respect and admiration. In 1773 he

served the office of sheriff, which, as he declared, "brought the distress of the prisoners more immediately under his notice," and led him to form the design of visiting the gaols throughout England, to devise means for alleviating the miseries of the sufferers. In 1774 he made an effort to get a seat in parliament for Bedford, in which he was unsuccessful; but the same year he was examined before the house of commons on the subject of the prisons, and received the thanks of the house on the occasion. He then went on with his benevolent views, and extended them to foreign countries, making various excursions through Europe between the years 1775 and 1787. In 1777 he published the State of Prisons in England and Wales, with preliminary Observations and an account of some foreign Prisons, 4to. In 1780 he published an appendix to this book, with an account of his travels in Italy; and in 1784 a new edition appeared with considerable additions. In 1789 he published an account of the principal lazarettos in Europe, in 4to. In this work he signified his intention of revisiting Russia, Turkey, and of extending his route into the east. "I am not insensible (says he) of the dangers that must attend such a journey. Trusting, however, in the protection of that kind Providence which has hitherto preserved me, I calmly and cheerfully commit myself to the disposal of unerring wisdom. Should it please God to cut off my life in the prosecution of this design, let not my conduct be uncandidly imputed to rashness or enthusiasm; but to a serious deliberate conviction that I am pursuing the path of duty, and to a sincere desire of being made an instrument of more extensive usefulness to my fellow-creatures than could be expected in the narrower circle of a retired life." Accordingly, to the great concern of his friends, he set out in the summer of 1789 on this hazardous enterprise; the principal object of which was to administer Dr. James's Powder, a medicine in high repute at home, in malignant fevers, under a strong persuasion that it would be equally efficacious in the plague. In this second tour in the East "it did please God to cut off his life;" for, having spent some time at Cherson, a new settlement of the empress of Russia, in the mouth of the Dnieper or Borysthenes, toward the northern extremity of the Black Sea, near Oczakow, he caught, in visiting the Russian hospital of that place, or as some say a young lady who was ill of the same complaint, a malignant fever, which carried him off on the 20th of January, after an illness of about twelve days: and after having been kept, according to his express directions to his servant, five days, he was buried, by his own desire, in the garden of a villa in the neighbourhood, belonging to a French gentleman from whom he had received great civilities, by his faithful servant who had attended him on his former journeyings, and whom he expressly enjoined not to return home till five weeks from his death. While absent on his first tour to Turkey, &c. his character for active benevolence had so much attracted the public attention, that a subscription was set on foot to erect a statue to his honour in St. Paul's cathedral, and 1500l. was quickly subscribed for that purpose. But some of those who knew Mr. Howard best, never concurred in the scheme, being assured that he would neither countenance nor accede to it: and in consequence of two letters from Mr. Howard himself to the subscribers, the design was laid aside. It has, however, been effected since his death: and surely, of all the statues or monuments ever erected by public gratitude to illustrious characters either in ancient or modern times, none was ever erected in honour of worth so genuine and admirable as his; who devoted his time, his strength, his fortune, and finally sacrificed his life, to the pursuits of humanity; who, to adopt the expressive words of Mr. Burke, in his speech at Guildhall in Bristol, in 1780, "visited all Europe, and the East, not to survey the sumptuousness of palaces, or the stateliness of temples; not to make accurate measurements of the remains of ancient grandeur, nor to form a scale of the curiosity of modern art; not to collect medals, or to collate manuscripts; but to dive into the depth of dungeons; to plunge into the infection of hospitals; to survey the mansions of sorrow and of pain; to take the gauge and dimensions of misery, depression, and contempt; to remember the forgotten; to attend to the neglected; to visit the forsaken; and to compare and collate the distresses of all men in all countries. His plan is original; and it is as full of genius as it is of humanity. It is a voyage of discovery, a circumnavigation of charity; and already the benefit of his labour is felt more or less in every country."

For other fine remarks on the conduct of this admirable philanthropist, see Foster's valuable Essay on Decision of Character.

HOWBE'IT. } *ad.* (*how be it.*) Neverthe-
HO'WBE. } less; notwithstanding; yet; however: not in use (*Hooker*).

HOWDEN, a town in the east riding of Yorkshire, with a market on Saturdays. Here was formerly a collegiate church of five prebends, erected in the sixteenth century: it is now the parish-church. This town gives name to a small district called Howdenshire. Lat. 51. 50 N. Lon. 9. 39 E.

HOWDY'E. (contracted from *how do ye?*) In what state is your health? (*Pope*).

HOWE (John), an eminent nonconformist divine, was born at Loughborough in Leicestershire, in 1630, and educated at Cambridge, from whence he removed to Ox-

ford, and became fellow of Magdalen college. He was ordained in the presbyterian way, and was appointed minister of Torrington in Devonshire, from whence he was ejected for nonconformity in 1662. He had been in great favour with Cromwell, and was his chaplain for some time. In 1671 he went to Ireland as chaplain to lord Massarene, and the bishop of the diocese gave him his licence to preach. In 1675 he came to London, and was greatly esteemed by all parties for his learning, moderation, and piety. He died in 1705. He published the Living Temple, in 2 vols. 8vo. besides other pieces of less note.

HOWE (Richard earl), a gallant English admiral, was born in 1725, and entered the naval service so young that at the age of twenty he was appointed captain of the Baltimore sloop of war, in which he attacked two French frigates, of 30 guns each, with such spirit, that they were obliged to sheer off. He received in this action a severe wound in the head, which had nearly proved fatal; for this he was made a post captain, and appointed to the Triton frigate. After a variety of active service, he obtained the command of the Dunkirk of 60 guns, with which he captured a French 64, off the coast of Newfoundland. In 1757 he served under admiral Hawke on the coast of France, and the next year he was appointed commodore of a small squadron, with which he destroyed a great number of ships and magazines at St. Malo. The year following prince Edward was put under his care, and the commodore on the 6th of August took the town of Cherbourg and destroyed the bason. This was followed by the unfortunate affair of St. Cas, where he displayed his courage and humanity in saving the retreating soldiers at the imminent hazard of his own life. The same year, by the death of his brother in America, he became lord Howe; and soon afterwards had a glorious share in the victory over Conflans. When admiral Hawke presented him, on this occasion, to the king, his majesty said, "Your life, my lord, has been one continued series of services to your country." In 1763 he was appointed to the admiralty board, where he remained till 1765, when he was made treasurer of the navy. In 1770 he was promoted to be rear-admiral of the blue, and commander-in-chief in the Mediterranean. In the American war he commanded the fleet on that coast, but little was done there, because no opportunity offered of doing much. In 1782 he was sent to the relief of Gibraltar, a service which he performed in the most admirable manner, in sight of the hostile fleet, which he challenged in vain to battle. The year following he was made first lord of the admiralty, which office he soon afterwards resigned to lord Keppel; but at the end of the year he was reappointed, and continued in that station till 1788, in which year he was created an earl of Great Britain. In 1793 his lordship accepted the command of the channel fleet, and June 1, 1794, he obtained a decisive victory over the most powerful fleet France ever equipped for sea. The same month he was visited on board his ship, at Spithead, by their majesties, when the king presented him with a magnificent sword, a gold chain, and medal. He also received the thanks of both houses of parliament, the freedom of the city of London, and the universal plaudits of the nation. In 1795 he succeeded admiral Forbes, as general of the marines, and in 1797 he was honoured with the order of the garter. The same year he resigned the command of the western squadron. His lordship died in August, 1799. (*Watkins.*)

Lord HOWE's Island, a small island in the neighbourhood of New South Wales, discovered on February 17, 1788, S. lat. 31. 36, E. long. 159. 4. It is of an arched figure, lying from north-west to south-east, the two extremities including a space of about six miles, though, by reason of the curved figure of the island itself, it is near seven in length. It is deeply indented on the middle of the eastern part by a bay, named Ross's Bay, and on the opposite and western part has another named Prince William Henry's Bay; so that the whole has the appearance of two islands joined together by an isthmus, which in some places is not above half a mile broad. On the southern part of that division which lies most to the northward are two considerable bays, named Callam's and Hunter's Bay; and on the south-western part of the other are two high mountains, the most southerly named Mount Gower, and the other Mount Lidgbird. The convex part of the island lying towards the north-east, and the concave side towards the opposite quarter, are terminated by two points, named Point King and Point Philip. No fresh water was found on the island; but it abounds with cabbage-palms, mangrove, and manchineel trees, even up to the summits of the mountains. There are plenty of ganets, and a land fowl of a dusky-brown colour, with a bill about four inches long, and feet like those of a chicken. These were found to be remarkably fine meat, and were very fat. There are many large pigeons, and the white birds found in Norfolk Island were also met with in this place.

HOWE'VER. *ad.* (*how* and *ever.*) 1. In whatsoever manner; in whatsoever degree (*Shakspeare*). 2. At all events; happen what will; at least (*Tillotson*). 3. Nevertheless; notwithstanding; yet (*Swift*).

HO'WITZERS, in Artillery, are a kind of mortars, of German invention, which are mounted upon carriages like travelling gun-carriages, and have their trunnions placed nearly in the middle. The construction of howitzers is as various as that of mortars,

excepting the chambers, which are all cylindric. They are distinguished by the diameter of the bore; thus a ten-inch howitzer is that, the diameter of which is ten inches. Howitzers are capable of doing great execution, by firing shells and grape shot in a siege, where the distance is small; and in the field, if they are placed in the flanks, or between the battalions. They are also more easily carried from one place to another than mortars.

To HOWL. *v. n.* (*huglen*, Dutch; *ululo*, Latin.) 1. To cry as a wolf or a dog (*Shakspeare*). 2. To utter cries in distress (*Shakspeare*). 3. To speak with a belluine cry or tone. 4. It is used poetically of many noises loud and horrid.

Howl. *s.* (from the verb.) 1. The cry of a wolf or dog (*Swift*). 2. The cry of a human being in horror.

HOWSOE'VER. *ad.* (*how* and *soever*.) 1. In what manner soever (*Raleigh*). 2. Although (*Shakspeare*).

HOWTH, a promontory which forms the northern entrance of the bay of Dublin, having a small village about seven miles from that city. It gives title of earl to the family of St. Lawrence. Lat. 53. 25 N. Lon. 6. 16 W.

To HOX. *v. a.* (from hoȝ, Saxon.) To hough; to hamstring (*Knolles*).

HOXTER, a town of Westphalia, seated on the Weser. Lat. 51. 50 N. Lon. 9. 39 E.

HOY, a small vessel or bark, usually rigged like a sloop, and employed for carrying passengers and luggage from one place to another, particularly on the sea-coast. In Holland the hoy has two masts: in England it has but one; then the mainsail is sometimes extended by a boom, and sometimes without it.

Hoy, one of the Orkney islands, situated between the island of Pomona and the north coast of Caithness-shire. It is about ten miles long. On this island, beside the great conic hill of Holyhead, which is a sea-mark, there is a stupendous rock, called the Beary, where a bird, here named the layer, supposed to be a species of penguin, is found. It is about the size of a small duck, remarkably fat, and esteemed by many a great delicacy. These birds burrow in the rabbit-holes. The person employed in taking the young is usually let down by a rope from the top of the precipice. In this island too, in a gloomy valley, is an entire stone, 36 feet long, and 18 broad, called the Dwarfic stone. It is hollow within, having the form of a bed and pillow cut in the stone. It is supposed to have been once the habitation of a hermit. W. long. 3. 20. N. lat. 58. 56.

HOYE, a town of Germany, in Westphalia, capital of a county of the same name, and subject to the elector of Hanover. It is seated on the river Weser. Lat. 52. 57 N. Lon. 9. 6 E.

HUA, or Hahua, the capital of Cochin China, with a royal palace. It is seated on a beautiful plain, and divided into two parts by a large river. The inhabitants blacken their teeth, thinking white teeth disgraceful. Lat. 17. 40 N. Lon. 105. 5 E.

HUAHEINE, one of the Society Islands, in the southern Pacific Ocean, eight leagues in circumference, separated by a deep gulf into two peninsulas, united by an isthmus, which is overflowed by the sea in high tides. The vegetable productions are similar to those of Otaheita. The harbour of Owharra, on the west coast, has good anchorage, in eighteen-fathom water, secure from winds. Long. 151. W. Greenwich. Lat. 16. 43 N.

HU'BBUB. *s.* A tumult; a riot (*Clarendon*).

HU'CKABACK. *s.* A kind of linen on which the figures are raised.

HU'CKLEBACKED. *a.* (*hocker*, German, a bunch.) Crooked in the shoulders.

HU'CKLEBONE. *s.* (from *hucken*, Dutch.) The hipbone.

HU'CKSTER. } *s.* (*hock*, German, a
HU'CKSTERER. } pedlar; *huckster*, a she-pedlar. 1. One who sells goods by retail, or in small quantities; a pedlar (*South.*) 2. A trickish mean fellow (*Spenser*).

To Hu'ckster. *v. n.* (from the noun.) To deal in petty bargains (*Swift*).

HUDDERSFIELD, or Huthersfield, a town in the county of York, celebrated for its woollen manufacture, which consists of narrow cloths, fine and coarse, fine broad-cloths, serges, kerseymeres, &c. The market is on Tuesday, when the cloth is exposed to sale in a large hall, and merchants and wool-staplers attend from a considerable distance. This town contains 1974 houses, and 10,670 inhabitants. Lat. 53. 40 N. Long. 1. 40 W.

To HU'DDLE. *v. a.* (probable from *hood*.) 1. To dress up close so as not to be discovered; to mobble. 2. To put on carelessly in a hurry (*Swift*). 3. To cover up in haste. 4. To perform in a hurry (*Dryden*). 5. To throw together in confusion (*Locke*).

To Hu'ddle. *v. n.* To come in a crowd or hurry (*Milton*).

Hu'ddle. *s.* (from the verb.) Crowd; tumult; confusion (*Addison*).

HUDSON (Henry), an eminent English navigator, who, about the beginning of the 17th century, undertook to find out a passage by the north-east or north-west to Japan and China. For this purpose he was four times fitted out: he returned three times unsuccessful; but in the last voyage, in 1610, being persuaded that the great bay to which his name has been since given, must lead to the passage he sought, he wintered there, to prosecute his discovery in the spring. But their distresses during the winter producing a mutiny among his men, when the spring arrived, they turned him, with his son and seven sick men, adrift in his own shallop, and proceeded home with

the ship. As Hudson and his unhappy companions were never heard of afterward, it is to be supposed they all perished.

HUDSON, a town of United America, in the state of New York. This town was only begun in the year 1783, and is now become a flourishing town with great trade, assisted by the excellent situation, on the river from which it receives its name: 100 miles N. New York. Long. 73. 40 W. Greenwich. Lat. 42. 20 N.

HUDSON'S BAY, a large bay of North America, lying between 51 and 69 N. latitude, and discovered, in 1610, by Mr. Henry Hudson. This intrepid mariner, in searching after a N. W. passage to the South Sea, discovered three straits, through which he hoped to find out a new way to Asia by America. He had made two voyages before on the same adventure; the first in 1607, and the second in 1608. In his third and last, in 1610, he entered the straits that lead into this new Mediterranean, the bay known by his name; coasted a great part of it, and penetrated to 80 degrees and a half to the heart of the frozen zone. His ardour for the discovery not being abated by the difficulties he struggled with in this empire of winter, and world of frost and snow, he staid here till the ensuing spring, and prepared, in the beginning of 1611, to pursue his discoveries; but his crew, who suffered equal hardships, without the same spirit to support them, mutinied, seized him and seven of those who were most faithful to him, and committed them to the fury of the icy seas in an open boat. Hudson and his companions were either swallowed up by the waves, or, gaining the inhospitable coast, were destroyed by the savages.

The country lying round Hudson's Bay is called New Britain, including Labrador, now New North and South Wales. The entrance of the bay, from the ocean, after leaving to the N. Cape Farewell and Davis's Straits, is between Resolution Isles on the N. and Button's Isles on the Labrador coast to the S. forming the eastern extremity of the strait distinguished by the name of its great discoverer. The vast countries that surround Hudson's Bay, abound with animals whose skins and furs are far superior in quality to those found in less northerly regions.

In 1670 a charter was granted to a company, which does not consist of above ten persons, for the exclusive trade to this bay; and they have acted under it, ever since, with great benefit to themselves. They employ four ships and 130 seamen, and have several forts; namely, Prince of Wales's Fort, Churchill River, Nelson, New Severn, and Albany, which are all seated on the west side of the bay. The French, commanded by the late unfortunate navigator, M. de la Peyrouse, destroyed these forts, and the settlements, &c. valued at 500,000l.; but the damage has been since repaired, and the commerce is now in a flourishing situation. See NEW BRITAIN, ESKIMAUX, and LABRADOR.

HUDSON'S STRAITS, or FROBISHER'S MISTAKEN STRAIT, the narrow sea between the Atlantic Ocean and Hudson's bay, north of Labrador.

HUDSON'S RIVER, a river of United America, which rises in the north-east part of the state of New York, and empties itself into the sea ten miles south of New York, taking a southerly direction during almost its whole course; it is navigable for ships to Hudson, and for sloops of 70 or 80 tons to Albany.

HUDSO'NIA, in botany, a genus of the class dodecandria, order monogynia: calyx three-leaved, tubular; corol, five-petalled; stamens fifteen; capsule, one-celled, three-valved, three-seeded. One species only, a Virginian shrub, resembling a heath in its more prominent characters.

HUE. *s.* (hepe, Saxon.) 1. Colour; die (*Milton*). 2. (*huée*, French.) A clamour; a legal pursuit; an alarm given to the country. It is commonly joined with *cry*. (*Arbuthnot*.)

HUE AND CRY, in law, the pursuit of a person who has committed felony on the highway. Of this custom, which is of British origin, the following deduction is given by Mr. Whitaker. "When it was requisite for the Britons to call out their warriors into the field, they used a method that was particularly marked by its expeditiousness and decisiveness, and remains partially among us to this moment. They raised a cry, which was immediately caught up by others, and in an instant transmitted from mouth to mouth through all the region; and, as the notice passed along, the warriors snatched their arms, and hurried away to the rendezvous. We have a remarkable description of the fact in Cæsar, and there see the alarm propagated in 16 or 17 hours through 160 miles in a line; and the same practice has been retained by the highlanders to our own time. When the lord of a clan received intelligence of an enemy's approach, he immediately killed a goat with his own sword, dipped the end of a half-burnt stick in the blood, and then gave it and the notice of the rendezvous to be carried to the next hamlet. The former symbolically threatened fire and sword to all his followers that did not instantly repair to the latter. The notice was dispatched from hamlet to hamlet with the utmost expedition; and in three or four hours the whole clan was in arms, and assembled at the place appointed. This was within these few years the ordinary mode by which the chieftains assembled their followers for war. The first person that received the notice, set out with it at full speed, and delivered it to the next that he met; who instantly set out with the same speed, and handed it to a third. And, in the late rebel-

lion of 1745, it was sent by an unknown hand through the region of Breadalbane; and, flying as expeditiously as the Gallic signal in Cæsar, traversed a tract of 32 miles in three hours. This quick method of giving a diffusive alarm is even preserved among ourselves to the present day; but is applied, as it seems from Cæsar's account above to have been equally applied among the Celtæ, to the better purpose of civil polity. The ***hutesium and clamour*** of our ancient laws, and the ***hue and cry*** of our own times, is a well known and powerful process for spreading the notice and continuing the pursuit of any fugitive felons. The cry, like the clamor of the Gauls or the summons of the highlanders, is taken from town to town and from county to county; and a chain of communication is speedily carried from one end of the kingdom to the other."

In cases of hue and cry, the party grieved, or any other, may resort to the constable of the vill; and, 1. give him such reasonable assurances thereof as the nature of the case will bear: 2. if he knows the name of him that did it, he must tell the constable the same: 3. if he knows it not, but can describe him, he must describe him, his person, or his habit, or his horse, or such circumstances as he knows, which may conduce to the discovery: 4. if the thing is done in the night, so that he knows none of these circumstances, he must mention the number of persons, or the way they took: 5. if none of all these can be discovered (as where a robbery, or burglary, or other felony, is committed in the night), yet they are to acquaint the constable with the fact, and desire him to search the town for suspected persons, and to make hue and cry after such as may probably be suspected as being persons vagrant in the same night; for many circumstances may happen to be useful for discovering a malefactor, which cannot at first be found out.

For the levying of hue and cry, although it is a good course to have a justice's warrant, where time will permit, in order to prevent causeless hue and cry; yet it is not necessary nor always convenient, for the felon may escape before the warrant is obtained. And upon hue and cry levied against any person, or where any hue and cry comes to a constable, whether the person is certain or uncertain, the constable may search suspected places within his vill, for the apprehending of the felon. And if the person against whom the hue and cry is raised, is not found in the constablewick, then the constable, and also every officer to whom the hue and cry shall afterwards come, ought to give notice to every town round about him, and to one next town only; and so from one constable to another, until the offender is found, or till they come to the sea-side. And this was the law before the Conquest.

And in such cases it is needful to give notice in writing to the pursuers of the thing stolen, and of the colour and marks thereof; as also to describe the person of the felon, his apparel, horse, or the like, and which way he is gone, if it may be: but if the person that did the fact is neither known, nor describable by his person, clothes, or the like, yet such an hue and cry is good, and must be pursued, though no person certain can be named or described. 2 H. H. 100. 103.

HUEN, an island of the Baltic, three miles from the coast of Sweden, and subject to the Swedes, to whom it was ceded by the Danes in 1658. In this island was the observatory of the celebrated Tycho Brahe. Lat. 55. 54 N. Lon. 12. 38 E.

HUER, a name given to certain fountains in Iceland, of a most extraordinary nature; forming at times *jets d'eau* of scalding water, ninety-four feet high and thirty in diameter; creating the most magnificent gerbes that can be imagined, especially when backed by the setting sun. They arise out of cylindrical tubes of unknown depths: near the surface they expand into apertures of a funnel-shape; and the mouths spread into a large extent of stalactical matter, formed of successive scaly concentric undulations. The playing of these stupendous spouts is foretold by noises roaring like the cataract of Niagara. The cylinder begins to fill: it rises gradually to the surface, and as gradually increases its height, smoking amazingly, and flinging up great stones. After attaining its greatest height, it gradually sinks till it totally disappears. Boiling *jets d'eaux* and boiling springs are frequent in most parts of the island; and in many parts they are applied to the culinary uses of the natives. The most capital is that which is called Geyer or Geyser, in a plain rising into small hills, and in the midst of an amphitheatre bounded by the most magnificent and various-shaped icy mountains; among which the three-headed Hecla soars pre-eminent. These huers are not confined to the land: they rise in the very sea, and form scalding fountains amidst the waves. Their distance from the land is unknown; but the new volcanic isle, twelve miles off the point of Reickenes, emitting fire and smoke, proves that the subterraneous fires and waters extend to that space; for those awful effects arise from the united fury of these two elements.

HUER. *s.* (*huer*, French, to cry.) One whose business is to call out to others (*Carew*).

HUESCO, an ancient town of Spain, in Arragon, with a bishop's see, and a university. Lat. 42. 18 N. Long. 0. 2 W.

HUET (Peter Daniel), a learned French bishop, was born at Caen in Normandy, in 1630. He studied under the greatest man in France, particularly Father Mambrun, and the learned Bochart, whom he accompanied in 1652 to the court of Christina, queen of Sweden, who would have engaged him in her

service, but he declined the offer, and returned to France. In 1661 he published a work upon the art of translation, entitled, De Interpretatione Liori Duo, which has been frequently reprinted, and is greatly admired. In 1679, he published his Demonstratio Evangelica, a work which has met with unbounded approbation. His reputation was now so great that the place of subpreceptor to the dauphin was conferred on him, and he had for his colleague the illustrious Bossuet. In 1688 appeared his Origenis Commentaria, &c. cum Latina Interpretatione Noris et Observationibus, 2 vols. folio. The plans of publishing editions of the classics "in usum Delphini" was his, and he superintended its execution. In 1678 he was presented to the abbey of Aunay, in Normandy, and in 1685 he was nominated to the see of Soissons, which he afterwards exchanged for that of Avranches. In 1689 he printed his Censura Philosophiæ Cartesianæ, by which it appears that he had not only renounced his attachment to the Cartesian philosophy, but that he was become its avowed enemy. In 1699 he resigned his bishopric, and was presented to the abbey of Fontenay, near Caen. He died at Paris in 1721. Huet, considering the number and the excellence of his works, may be considered with justice as one of the most learned men that any age has produced. Three books of his have been translated into English; on the Origin of Romances; on the Situation of the Terrestrial Paradise; and the History of the Commerce and Navigation of the Ancients.

HUFF. *s.* (from *hove*, or *hoven*, swelled). 1. Swell of sudden anger or arrogance (*Hudibras*). 2. A wretch swelled with a false opinion of his own value (*South*).

To HUFF. *v. a.* (from the noun). 1. To swell; to puff (*Grew*). 2. To hector; to treat with insolence and arrogance, or brutality (*Eachard*).

To HUFF. *v. a.* To bluster; to bounce; to swell with indignation or pride. (*Otway*).

HU'FFER. *s.* (from *huff*). A blusterer; a bully. (*Hudibras*).

HU'FFISH. *a.* (from *huff*). Arrogant; insolent; hectoring.

HU'FFISHLY. *ad.* With arrogant petulence.

HU'FFISHNESS. *s.* Petulance; arrogance; noisy bluster.

To HUG. *v. a.* (hegian, Saxon). 1. To press close in an embrace (*L'Estrange*). 2. To fondle; to treat with tenderness (*Milton*). 3. To hold fast (*Atterbury*).

HUG. *s.* (from the noun.) Close embrace (*Gay*).

HUGE. (*hoogh*, *high*, Dutch.) 1. Vast; immense (*Abbot*). 2. Very great (*Milton*). 3. Great even to deformity or terribleness (*Shakspeare*).

HU'GELY. *ad.* (from *huge.*) 1. Immensely; erroneously (*Shakspeare*). 2. Greatly; very much (*Swift*).

HU'GENESS. *s.* (from *huge.*) 1. Enormous bulk; greatness. 2. Utmost extent; not in use. (*Shakspeare*).

HU'GGERMUGGER. *s.* Secrecy; byplace. (*Hudibras*).

HUGHES (John), an English poet, was born at Marlborough in Wiltshire, in 1677. He received his education in London, and though he had a great love for literature, he yet applied himself to business, and attained a place in the ordnance office. His first publication was an Ode on the Peace of Ryswick, 1697, which was well received, and introduced him to the acquaintance of several poets. In 1717 he was appointed secretary to the commission of the peace, by the lord chancellor Cowper. His last work was the popular play of the Siege of Damascus; but it is remarkable that he expired in the first night of its performance, Feb. 17, 1728. In 1735 his poems were published in 2 vols. 12mo. He also wrote several pieces in prose, particularly some papers in the Tatler, Spectator, and Guardian; and published an edition of Spenser's works, in 6 vols. 12mo.

HUG'ONIA, in botany, a genus of the class monadelphia, order decandria. Calyx five-parted, unequal; petals five; styles five; drupe one-seeded, with a striate and about ten-celled nut. Three species, trees of Mauritius and the East Indies.

HUGUENOTS, an appellation given by way of contempt to the reformed or protestant Calvinists of France.

The name had its first rise in 1560; but authors are not agreed as to the origin and occasion thereof; but one of the two following seems to be the least forced derivation.

One of the gates of the city of Tours is called the gate Fourgon, by corruption from *feu Hugon*, i. e. the late Hugon. This Hugon was once count of Tours, according to Eginhardus, in his Life of Charles the Great, and to some other historians. He was it seems a very wicked man, who by his fierce and cruel temper made himself dreadful; so that after his death he was supposed to walk about in the night time, beating all those he met with: this tradition the judicious Thuanus has not scrupled to mention in his history. Davila and other historians pretend, that the nickname of Huguenots was first given to the French protestants, because they used to meet in the night time in subterraneous vaults near this gate of Hugon; and what seems to countenance this opinion is, that they were first called by the name of Huguenots at this city of Tours.

Others assign a more illustrious origin to that name; and say that the leaguers gave it to the reformed, because they were for keeping the crown upon the head of the present line descended from Hugh Capet; whereas they were for giving it to the house of Guise, as descended from Charles the Great.

Others again derive it from a French and

faulty pronunciation of the German word *eidgnossen*, signifying confederates, and originally applied to that valiant part of the city of Geneva, which entered into an alliance with the Swiss cantons, in order to maintain their liberties against the tyrannical attempts of Charles III. duke of Savoy.

These confederates were called Eignots, whence Huguenots.

The persecution which they underwent has scarce its parallel in the history of religion: though they obtained a peace from Henry III. in 1576, it was only of short continuance; and their sufferings, mitigated by the famous edict of Nantes, granted to them in 1598 by Henry IV. were again renewed, after the revocation of this edict, by Lewis XIV. in 1685.

The unfortunate Louis the XVI. whatever were his weaknesses and failings in other respects, had not been rendered inhuman by a large share of Catholicism; but laboured to heal all their wounds, when the storm arose, of which he was one of the first, and the most illustrious of the victims. It ought ever to be remembered, to the honour of this unhappy monarch, that he paid no attention to the intolerant and disgraceful "Memoire de l' Assemblée generale du clergé," in 1780, against the reformed. During his reign, a law was passed, which gave to his non-Roman Catholic subjects, as they were denominated, all the civil advantages and privileges of their Roman Catholic brethren. From that period the situation of the French protestants (for the obnoxious term Huguenots seems to have been almost laid aside), has been tolerably happy. But what seems to have given a stability and respectability to the French Protestants, are the decrees which have been passed in their favour by the present Emperor of France. On Sunday the 9th of August, 1807, the consistory of the Protestant church being admitted to an audience, their president, M. Marron, addressed the Emperor in a speech of considerable eloquence, in which he gratefully acknowledged his protection and care of them as a religious body; and declared that the roofs of their temples shall ever resound with praises for such signal favours as they enjoy under his auspices. His speech was answered in the most gracious and cordial manner. The following expressions in it are remarkable: "I accept the blessing and the congratulation of the consistory. You owe me no obligation; I wish not men to think themselves indebted to me, because I have been merely just. Conscience is not within the jurisdiction of human laws: I guarantee to you, for myself and my successors, not only the intendance, but also the perfect freedom and inviolability of your worship. The Protestants have always proved themselves to be good citizens, and faithful subjects of the law. Though I do not profess their religion, tell them that I place them in the circle of my best friends!"

Buonaparte continues to pursue this line of policy respecting the Protestants. Upon th subject of religious worship, an *Exposé* of his in the autumn of 1809, says, "The government, in its respect for conscience, has not deviated from the line which it had traced out to itself. Its principles, with respect to religion, have had their application, this year, as in the preceding. It does not confine itself to the toleration of all kinds of religious forms of worship, *it honours and encourages them*. The different sects of Christianity, founded on the morality of the gospel, are all useful to society. The Lutherans of the Fauxbourg St. Antoine, whose number amounts to 6000, had no temple, and, from time immemorial, exercised their worship in the Swedish chapel. Their church has been acknowledged; their ministers have been appointed by the Emperor, and are maintained at the expence of the state. A school of Calvinistic Theology has been established at Montauban."

Thus are the once despised and persecuted Huguenots raised from situations of suffering and wretchedness to that rank in society which is the unalienable right of every honest man, be his religious principles what they may.

HU'GY. *a.* (See HUGE.) Vast; great; huge; not in use (*Carew*).

HUKE. *s.* (*huque*, French.) A cloak (*Bacon*).

HULK. *s.* (*hulcke*, Dutch; hulc, Saxon.) 1. The body of a ship (*Shakspeare*). 2. Any thing bulky and unwieldy (*Shakspeare*).

To HULK. *v. a.* To exenterate: as, to hulk a hare (*Ainsworth*).

HULL. *s.* (*hulgan*, Gothick, to cover.) 1. The husk or integument of any thing; the outer covering. 2. The body of a ship; the hulk (*Grew*).

To HULL. *v. n.* (from the noun.) To float; to drive to and fro upon the water without sails or rudder (*Sidney*).

HULL, a river of England, in the county of York, which runs into the Humber at Hull.

HULL, or Kingston-upon-Hull, a seaport town of England, in the county of York, situated on the north side of the river Humber, at the mouth of the river Hull, from which it takes its name, formerly defended by a strong wall, ditches, ramparts, and half moons. It was built in the year 1296, by Edward the First, after his return from Scotland, who made it a free borough, and endowed it with many privileges. In the year 1440, and reign of Henry VI. it was erected into a county, including a district of some miles distance, and the government invested in a mayor, and aldermen. Hull is situated low, and was formerly subject to great inundations, but by proper drains that complaint is now remedied. The commerce of Hull has for some time been constantly increasing, so as to render it probably the fourth port for business in the kingdom. Its

situation is extremely advantageous; for, besides its communication with the Yorkshire rivers and canals, it has also access, by means of the Humber to the Trent, and all its branches and communications: hence it has the import and export trade of many of the northern and midland counties. The foreign trade is chiefly to the Baltic; but it has also regular traffic with the southern parts of Europe, and with America. More ships are sent from hence to Greenland than any other port, that of London excepted. The coasting trade for coals, corn, wool, manufactured goods, &c. is very extensive. A new dock has lately been constructed, in which eighty ships may ride safely and conveniently; and this dock is now undergoing a considerable enlargement, so as to extend to the Humber. There are two churches, an exchange, infirmary, and a Trinity-house, which is a corporation composed of a society of merchants, for the relief of aged and distressed seamen, their wives and widows. Hull is defended by three forts, garrisoned by soldiers. It is the seat of a governor, lieutenant-governor, and other officers. Hull sends two members to the British parliament, and has two markets weekly, on Tuesdays and Saturdays. In the year 1800, Hull contained 4767 houses, and 29,516 inhabitants. Lat. 53. 45. N. Lon. 0. 14. W.

HU'LLY. *a.* (from *hull.*) Siliquose; husky.

HULST, a strong town of Dutch Flanders, seated on a plain, which may be overflowed. Lat. 51. 18. N. Lon. 4. 6. E.

HU'LVER. *s.* Holly (*Tusser*).

To HUM. *v. a.* (*homelan*, Dutch.) 1. To make the noise of bees (*Dryden*). 2. To make an inarticulate and buzzing sound (*Shakspeare*). 3. To pause in speaking, and supply the interval with an audible emission of breath (*L'Estrange*). 4. To make a dull heavy noise (*Glanville*). 5. To sing low (*Pope*). 6. To applaud. Approbation was formerly expressed in public assemblies by a hum.

Hum. *s.* (from the verb.) 1. The noise of bees or insects (*Shakspeare*). 2. A low confused noise, as of bustling crowds at a distance (*Milton*). 3. Any low dull noise (*Pope*). 4. A pause with an inarticulate sound. (*Dr.*) 5. In *Hudibras*, it seems used for *ham*. 6. An expression of applause (*Spectator*).

Hum. *interj.* A sound implying doubt and deliberation (*Shakspeare*).

HU'MAN. *a.* (*humanus*, Lat. *humain*, Fr.) 1. Having the qualities of a man (*Swift*). 2. Belonging to man (*Milton*).

Human Body, in physiology. See Homo and Man.

HUMA'NE. *a.* (*humaine*, French.) Kind; civil; benevolent; good-natured (*Sprat*).

HUMA'NELY. *ad.* (from *humane.*) Kindly; with good-nature (*Shakspeare*).

HU'MANIST. *s.* (*humaniste*, French.) A philologer; a grammarian.

HUMA'NITY. *s.* (*humanité*, French.) 1. The nature of man (*Sidney*). 2. Humankind; the collective body of mankind (*Glanville*). 3. Benevolence; tenderness (*Locke*). 4. Philology; grammatical studies.

To HU'MANIZE. *v. a.* (*humaniser*, Fr.) To soften; to make susceptive of tenderness or benevolence (*Wotton*).

HU'MANKIND. *s.* (*human* and *kind.*) The race of man; mankind (*Pope*).

HU'MANLY. *ad.* (from *human.*) 1. After the notions of men (*Atterbury*). 2. Kindly; with good-nature. This is now written *humanely* (*Pope*).

HUMBER, a river formed by the Trent, Ouse, Derwent, and several other streams. By the late inland navigation, it has a communication with the rivers Mersey, Dee, Ribble, Severn, Thames, Avon, &c.; which navigation, including its windings, extends above 500 miles, in the counties of Lincoln, Nottingham, York, Lancaster, Westmoreland, Chester, Stafford, Warwick, Leicester, Oxford, Worcester. It divides Yorkshire from Lincolnshire, and falls into the German ocean near Holderness.

HU'MBIRD. *s.* (from *hum* and *bird.*) The humming bird (*Brown*).

HU'MBLE. *a.* (*humble*, French; *humilis*, Lat.) 1. Not proud; modest; not arrogant (*Shakspeare*). 2. Low; not high; not great (*Cowley*).

To Humble. *v. a.* (from the adjective.) 1. To make humble; to make submissive; to make to bow down with humility. (*Rog.*) 2. To crush; to break; to subdue (*Milton*). 3. To make to condescend (*Locke*). 4. To bring down from a height (*Hakewill*).

Humble Bee, in entomology. See Apis and Bombylius.

Humble Plant, in botany. See Mimosa.

HU'MBLENESS. *s.* (from *humble.*) Humility; absence of pride (*Herbert*).

HU'MBLER. *s.* (from *humble.*) One that humbles or subdues himself or others.

HU'MBLEMOUTHED. *a.* (*humble* and *mouth.*) Mild; meek (*Shakspeare*).

HU'MBLES, in stag-hunting, the internal trimmings obtained in breaking up a deer, which are always a perquisite to the keeper.

HU'MBLESSE. *s.* (from *humble.*) Humbleness; humility; obsolete (*Spenser.*)

HU'MBLY. *ad.* (from *humble.*) 1. Without pride; with humility; modestly; with timorous modesty (*Addison*). 2. Without height; without elevation.

HU'MBOLDTIA, in botany, a genus of the class pentandria, order monogynia. Calyx four-parted; petals five; legume oblong, compressed. One species; a tree of Ceylon.

HU'MDRUM. *a.* (from *hum*, *drone.*) Dull; dronish; stupid (*Hudibras*).

HUME (David), a celebrated historian and philosopher, was born at Edinburgh, in 1711. He was designed for the law by his friends, but having no inclination himself to that profession, he applied to business, and in 1734 became clerk to a merchant at Bristol, where, however, he did not continue

long, but went to France, where he wrote his treatise of Human Nature, which he published at London in 1738. This work, however, met with an indifferent reception; nor were his Moral Essays, which appeared in 1742, more successful. About this time he resided with the marquis of Annandale as a companion, but soon after he became secretary to general St. Clair, whom he attended to Vienna and Turin; and while he was abroad, his Enquiry concerning the Human Understanding was published in London. In 1752 appeared his Political Discourses, and his Enquiry concerning the Principles of Morals, the latter of which, in his opinion, was the best of his writings. In 1754 he published the first volume of a Portion of English History, from the Accession of James I. to the Revolution. This work had little success; but the second, which came out in 1756, met with a better fate, and "helped to buoy up its unfortunate brother." About the same period he published his Natural History of Religion, which was smartly answered by Dr. Warburton in a pamphlet, which Mr. Hume attributed to Dr. Hurd. In 1759 appeared his History of the House of Tudor, and in 1761 the more ancient part of the English History. The work was now become celebrated, and the author pocketed by it a good deal of money; a consolation which made him insensible to the attacks of critics. In 1763 he accompanied the earl of Hertford on his embassy to Paris, and in 1765 was left there as *charge d'affaires*. The year following he returned home, and soon afterwards became under secretary of state to Mr. Conway. In 1769 he retired into Scotland on an independent income, and died there in 1776. After his death appeared a work by him, entitled Dialogues concerning Natural Religion. Mr. Hume was master of a good style of composition, and had the art of stating common objections in a new form. His positions on religious points, however, are extremely fallacious, not to say frivolous. In the year 1776 was published a letter of Dr. Adam Smith's, giving an account of the death of Mr. Hume. The object of the author was to shew that Mr. Hume, notwithstanding his sceptical principles, had died with the utmost composure, and that in his life as well as at his death he had conducted himself as became one of the wisest and best men that ever existed. The letter is very much laboured, and yet does no honour either to the author or his friend. It could not represent Mr. Hume as supporting himself under the gradual decay of nature with the hopes of a happy immortality; but it might have represented him as taking refuge, with other infidels, in the eternal sleep of death. This, though but a gloomy prospect, would not have been childish; but the hero of the tale is exhibited as talking like a school-boy of his conferences with Charon, and his reluctance to go into the Stygian ferry-boat, and as consoling himself with the thought of leaving all his friends and his brother's family in particular, in great prosperity! The absurdities of this letter did not escape the watchful and penetrating eye of Dr. HORNE; and as he could not mistake its object, he held it up to the contempt and scorn of the religious world in A Letter to Adam Smith, L.L.D. on the Life, Death, and Philosophy of his friend David Hume, Esq. by one of the people called Christians. The reasoning of this little tract is clear and conclusive, while its keen, though good humoured wit is inimitable; and it was, some years afterwards, followed by a series of Letters on Infidelity, composed on the same plan, and with much of the same spirit. This small volume, to the second edition of which the letter to Dr. Smith was prefixed, is better calculated than almost any other with which we are acquainted, to guard the minds of youth against the insidious strokes of infidel ridicule, the only dangerous weapon which infidelity has to wield. An Account of the Life and Writings of Mr. Hume was published in 1807, in an 8vo. volume of 520 pages, by Mr. T. E. Ritchie. The biographer has taken care to record in his work Dr. Smith's account of Hume's "*sportive* disposition, notwithstanding the prospect of speedy dissolution," with the various sublime particulars of Charon and the ferry-boat. These have called forth some admirable strictures in the Eclectic Review, vol. 4. p. 15. in which the reader will find an unusual union of philosophic reasoning, applied in the most cogent manner, to this truly awful and remarkable exhibition. We regret much that the passage is too extensive for our narrow limits.

To HUME'CT. } *v. a.* (*humecto*, Latin; *humecter*, Fr.)
To HUME'CTATE. } To wet; to moisten (*Wiseman*).

HUMECTA'TION. *s.* (*humectation*, Fr.) The act of wetting; moistening (*Brown*).

HU'MERAL. *a.* (from *humerus*, Latin.) Belonging to the shoulder (*Sharp*).

HU'MERAL ARTERY. Arteria humeralis. Brachial artery. In anatomy, the axillary artery having passed the tendon of the great pectoral muscle, changes its name to the brachial or humeral artery, which name it retains in its course down the arm to the bend, where it divides into the radial and ulnar artery. In this course it gives off several muscular branches, three of which only deserve attention. 1. The arteria profunda superior, which goes round the back of the arm to the exterior muscles, and is often named the upper muscular artery. 2. Another, like it, called arteria profunda inferior, or the lower muscular artery. 3. Ramus anastomoticus major, which anastomoses round the elbow with the branches of the ulnar artery.

HU'MERUS, (humerus, i. m. from ὦμος, the shoulder.) Os humeri. Os brachii. In anatomy, a long cylindrical bone, situated between the scapula and fore-arm. Its upper extremity is formed somewhat laterally and in-

ternally, into a large, round, and smooth head, which is admitted into the glenoid cavity of the scapula. Around the basis of this head is observed a circular fossa, deepest anteriorly and externally, which forms what is called the neck of the bone, and from the edge of which arises the capsular ligament, which is farther strengthened by a strong membranous expansion, extending to the upper edge of the glenoid cavity, and to the coracoid process of the scapula; and likewise by the tendinous expansions of the muscles, inserted into the head of the humerus. This capsular ligament is sometimes torn in luxation, and becomes an obstacle to the easy reduction of the bone. The articulating surface of the head is covered by a cartilage, which is thick in its middle part, and thin towards its edges, by which means it is more convex in the recent subject than in the skeleton. This upper extremity, besides the round smooth head, affords two other smaller protuberances. One of these, which is the largest of the two, is of an irregular oblong shape, and is placed at the back of the head of the bone, from which it is separated by a kind of groove that makes a part of the neck. This tuberosity is divided, at its upper part, into three surfaces; the first of these, which is the smallest and uppermost, serves for the insertion of the supraspinatus muscle; the second, or middlemost, for the insertion of the infraspinatus; and the third, which is the lowest and hindmost, for the insertion of the teres minor. The other smaller tuberosity is situated anteriorly between the larger one and the head of the humerus, and serves for the insertion of the subscapularis muscle. Between these two tuberosities there is a deep groove, for lodging the tendinous head of the biceps brachii; the capsular ligament of the joint affording here a prolongation, thinner than the rest of the capsula, which covers and accompanies this muscle to its fleshy portion, where it gradually disappears in the adjacent cellular membrane. Immediately below its neck, the os humeri begins to assume a cylindrical shape, so that here the body of the bone may be said to commence. At its upper part is observed a continuation of the groove for the biceps, which extends downwards, about a fourth part of the length of the bone, in an oblique direction. The edges of this groove are continuations of the greater and lesser tuberosities, and serve for the attachment of the pectoralis, latissimus dorsi, and teres major muscles. The groove itself is lined with a glistening substance like cartilage, but which seems to be nothing more than the remains of tendinous fibres. A little lower down, towards the external and anterior side of the middle of the bone, it is seen rising into a rough ridge, for the insertion of the deltoid muscle. On each side of this ridge, the bone is smooth and flat, for the lodgment of the brachialis internus muscle; and behind the middle part of the outermost side of the ridge is a channel, for the transmission of vessels into the substance of the bone. A little lower down, and near the inner side of the ridge, there is sometimes seen such another channel, which is intended for the same purpose. The os humeri, at its lower extremity, becomes gradually broader and flatter, so as to have this end nearly of a triangular shape. The bone, thus expanded, affords two surfaces, of which the anterior one is the broadest, and somewhat convex; and the posterior one narrower and smoother. The bone terminates in four large processes, the two outermost of which are called condyles, though not designed for the articulation of the bone. These condyles, which are placed at some distance from each other, on each side of the bone, are rough and irregular protuberances, formed for the insertion of muscles and ligaments, and differ from each other in size and shape. The external condyle, when the arm is in the most natural position, is found to be placed somewhat forwarder than the other. The internal condyle is longer, and more protuberant than the external. From each of these processes a ridge is continued upwards at the sides of the bone. In the interval between the two condyles are placed the two articulating processes, contiguous to each other, and covered with cartilage. One of these, which is the smallest, is formed into a small, obtuse, smooth head, on which the radius plays. This little head is placed near the external condyle, as a part of which it has been sometimes described. The other, and larger process, is composed of two lateral protuberances and a middle cavity, all of which are smooth and covered with cartilage. From the manner in which the ulna moves upon this process, it has gotten the name of trochlea, or pulley. The sides of this pulley are unequal; that which is towards the little head is the highest of the two; the other, which is contiguous to the external condyle, is more slanting, being situated obliquely from within outwards, so that when the fore-arm is full extended, it does not form a straight line with the os humeri, and, for the same reason, when we bend the elbow, the hand comes not to the shoulder as it might be expected to do, but to the fore part of the breast. There is a cavity at the root of these processes, on each of the two surfaces of the bone. The cavity on the anterior surface is divided by a ridge into two, the external of which receives the end of the radius, and the internal one lodges the coronoid process of the ulna in the flexions of the fore-arm. The cavity on the posterior surface, at the basis of the pulley, is much larger, and lodges the olecranon when the arm is extended. The internal structure of the os humeri is similar to that of other long bones. In new born infants, both the ends of the bone are cartilaginous, and the large head, with the two tubercles above, and condyles, with the two articulat-

ing processes below, become epiphyses before they are entirely united to the rest of the bone.

HUMICUBA'TION. *s.* (*humi* and *cubo*, Lat.) Lying on the ground (*Bramhall*).

HU'MID. *a.* (*humide*, French.) Wet; moist; watry (*Newton*).

HUMI'DITY. *s.* (*humidité*, French) Moisture, or the power of wetting other bodies. It differs from fluidity, depending altogether on the congruity of the component particles of any liquor to the pores or surfaces of such particular bodies as it is capable of adhering to (*Quincy*).

HU'MILIS, (*Humilis*, from *humi*, on the ground, so named because it turns the eye downwards, and is expressive of humility). See *Rectus inferior oculi*.

HUMILIATI, a congregation of religious in the church of Rome, established by some Milanese gentlemen on their release from prison, where they had been confined under the emperor Conrad, or, as others say, under Frederick I. in the year 1162. This order, which acquired great wealth, and had no less than 90 monastries, was abolished by pope Pius V. in 1570, and their houses given to the Dominicans and Cordeliers for their luxury and cruelty.

HUMILIATION, *s.* (French.) 1. Descent from greatness; act of humility. 2. Mortification; external expression of sin and unworthiness (*Milton*). 3. Abatement of pride (*Swift*).

HUMILITY, in ethics, is a virtue consisting in the moderate value which a person puts upon himself, and every thing relating to him. Or, more particularly, it consists in not attributing to ourselves any excellence or good which we have not; in not over-rating any thing which we have or do; in not taking an immoderate delight in one's self; in not assuming more of the praise of a quality or action than belongs to us; and in a lowly sense and acknowledgement of our imperfections, errors, and sins. This virtue expresses itself in the modesty of our appearance, of our pursuits, and of our behaviour towards other men. It is distinguished from affectation, bashfulness, and meanness.

Mr. Hume, in his Dissertations on the Passions, has given very singular and fantastical definitions of humility, pride, &c. Some ingenious observations upon this part of Hume's writings may be seen in Cogan on the Passions, p. 350.

HUMMER. *s.* (from *hum.*) That which hums; an applauder (*Ainsworth*).

HUMMING-BIRD, in Ornithology. See Trochilus.

Humming *bird tree*, in Botany. See Chelme.

Hummoch, an island in the Indian ocean, about six miles long. Here is a Rajah, supported in his authority by the Dutch East India Company. Lat. 5. 27 N. Lon. 125. 12 E.

HU'MORAL. *a.* (from *humour*. Proceeding from the humours (*Harvey*).

HU'MORIST. *s.* (from *humorista*. Italian.) 1. One who conducts himself by his own fancy; one who gratifies his own humour (*Watts*). 2. One who has odd conceits (*Spectator*). 3. One who has violent and peculiar passions (*Bacon*).

HU'MOROUS. *a.* (from *humour.*) 1. Full of grotesque or odd images (*Addison*). 2. Capricious; irregular (*Dryden*). 3. Pleasant; jocular (*Prior*).

HU'MOROUSLY. *ad.* 1. Merrily; jocosely (*Swift*). 2. Capriciously, whimsically (*Calamy*).

HU'MOROUSNESS. *s.* (from *humorous.*) 1. Fickleness; capricious levity. 2. Jocularity; oddness of conceit.

HU'MORSOME. *a.* (from *humour.*) 1. Peevish; petulant. 2. Odd; humorous. (*Swift*).

HU'MORSOMELY. *ad.* Peevishly; petulantly.

HU'MOUR. *s.* (*humor*, Latin.) 1. Moisture (*Ray*). 2. The different kinds of moisture in man's body; phlegm, blood, choler, and melancholy. 3. General turn or temper of mind (*Sidney*). 4. Present disposition (*Dryden*). 5. Grotesque imagery; jocularity; merriment (*Temple*). 6. Tendency to disease; morbid disposition (*Temple*). 7. Petulance; peevishness (*South*). 8. A trick; a practice (*Shakspeare*). 9. Caprice; whim; predominant inclination (*Bacon*).

To Humour. *v. a.* (from the noun.) 1. To gratify; to sooth by compliance (*Shakspeare*). 2. To fit; to comply with (*Add*).

Humours *of the eye*, Anatomists and opticians distinguish three particular humours of the eye; which they call the Aqueous, Crystalline, and Vitreous.

These three humours have each their share in the refraction of the rays of light necessary to vision.

Authors, both ancient and modern, speak of the regeneration of the humours of the eye; and give us instances of their reproduction, when, by an accident, they had been let out; but their instances, strictly considered, generally go no farther than to the aqueous and vitreous humours.

HUMP. *s.* (corrupted perhaps from *bump.*) The protuberance formed by a crooked back (*Tatler*).

HU'MPBACK. *s.* (*hump* and *back.*) Crooked back; high shoulders (*Tatler*).

HUMPBA'CKED. *a.* Having a crooked back.

HU'MULUS, (*Humulus*, from *humus*, the ground, so named, because without factitious support it creeps along the ground). Hop: in botany a genus of the class dioecia, order hexandria. Male: calyx five-leaved; corolless; anthers with two pores at top. Female: calyx an oblique entire scale of the ament; corolless; chyles two: seed single, coated. One species only. H. Lupulus, which is found wild in the

hedges of our own country, as well as in other parts of Europe.

The hop now generally cultivated among us, however, is said to have been imported from the Netherlands, and that in the beginning of the sixteenth century: since which period it has progressively become, from its extensive growth and use, an object of such considerable traffic, as to have induced the legislature to have noticed it in a variety of statutes, the earliest of which may be found in the 5th and 6th of Edward VI. cap. 5. From the frequency with which it is now cultivated in most of our counties, the hop will probably become in another half century a regular branch of georgics, or husbandy; but as this is by no means the case at present, the few observations and instructions we can allow space for upon this subject we shall introduce into the present article.

The soil should be as rich as can well be obtained; deep and loamy, offering a due mixture between a wet spungy swamp and a stiff clay. If the subsoil be gravel or wet, it is esteemed preferable. Of the different sorts of hops, the grey and the white-bind are generally esteemed the best; they may be planted in October or March; the spring is usually preferred to the autumn. Prior to the planting, the hop-garden should be regularly laid out and carefully prepared. Having secured a good soil, the next object is, provide a sufficiency of air for every plant; and with this view, the hop-hills or elevations into which they are to be placed, should be situated eight or nine feet asunder in every direction, the order of the rows being straight or checkerwise at the option of the grower. These hills should be raised by a due mixture of manure with the common soil of the hop-garden: new dung must never be employed if the hop is to be planted as soon as the hills are ready. The best method is to use old dung in the proportion of about one-third to two-thirds of the soil with which it is blended. Five good sets should be planted in every hill: one in the middle of the rest in a circular direction upon its slope: they should be pressed close with the hand, and covered with fine earth; and a stick should be placed on each side of the hill to secure it.

The time for dressing is commonly the end of January or February, when the earth about the hills must be carefully removed, in order to give an opportunity of cutting away from the stork all its superfluous suckers, that the stork be not weakened by the alley, or kept clear. They should be poled in April, carefully and loosely bound with withered rushes, and as they begin to blow in the earlier part of July, they will be ready for gathering about Bartholomew tide.

The hop has of late years been employed in various forms in medicine; and especially in the form of tincture and extract, under which two modes it enters into the pharmacantic preparations of the new pharmacopœia of the London College. It is an excellent aromatic and tonic, and appears to have some good sedative properties.

HUMUS. Mould. In oryctology a genus of the class earths, order calcareous: consisting of carbonat of lime, a smaller proportion of cilex, hydrogen, and carbonic acid, gass, and oxyd of iron; formed by the decayed remains of animal and vegetable substances; light, friable, imbibing but not retaining water; meagre, rough, humid, of a dull colour; effervescing with nitric acid, becoming cinereous in a smaller heat; in a stronger, running into a frothy kind of glass. Ten species.

1. H. animalis. Animal mould. Impalpable, greedily imbibing water, hardly effervescing with nitre acid in its rude state, but sensibly so when burnt. Found in church-yards and other places abounding with putrid animal matter, white or cinereous, very light and fertile.

2. H. dædalea, common mould, brown, in a very subtile dust. Found in all inhabited places, principally originating from animal manure and depositions, so very fine as when mixed with water, to pass through a course cloth or filtering paper: affords the best and richest garden mould.

3. H. ruralis, vegetable mould. Black when moistened, cinereous when dry. Found in all places where there is decayed vegetable matter, especially in dry situations, and produces an excellent soil.

4. H. pauperata. Heath mould. Soon parting with its moisture, and when dry, becoming farinaceous. Found on heaths, and produces a poor soil; because its particles are so minute and impalpable, as in dry seasons to be blown about by the least breath of wind.

5. H. alpina. Brown with larger particles. Very common in alpine situations.

6. H. effervescens. Swelling after having absorbed and retained water some time. Common in spongy places, and perhaps originates from the rotten roots of plants; long in drying, and a bad soil for the farmer or gardener, because in the spring it intumesces by the frost at night and the heat by day, and lifts up and eradicates the smaller plants.

7. H. Lutum, very light, not combustible, black when moist. Found in swamps and marshes under water, and produced by the gradual corruption of bog-plants. It is serviceable in sandy soils.

8. H. martialis, coloured mould, with a martial tinge. Found in various parts of Britain, Sweden, Germany, and Syria, in swamps and marshes; yellowish brown, reddish, purplish, or black, coloured by containing oxyd of iron.

9. H. picea. Black, becoming solid as

it dries. Found in Scania, often in the cultivated lands, and requires a peculiar method of agriculture.

10. H. muriatica. Brown, of a saltish taste. Found in the deserts, on the confines of the red sea, Egypt and Syria.

To HUNCH. *v. a.* (*husch*, German.) 1. To strike or pinch with the fists. (*Arbuth.*) 2. (*hocker*, a crooked back, German.) To crook the back. (*Dryden.*)

HUNCHBA'CKED. *a.* (*hunch* and *back.*) Having a crooked back. (*Arbuthnot.*)

HU'NDRED. *a.* (hunꝺ, hunꝺꞃeꝺ, Saxon.) The number consisting of ten multiplied by ten.

Hundred. *s.* A company, body, or collection consisting of a hundred. (*Abuthnot*).

Deal boards are sold at sixscore to the hundred, called the long hundred. Pales and laths are counted at five score to the hundred, if five feet long; and six score, if three feet long.

Hundred, hundredum, or *Centuria*, a part or division of a country; which was anciently so called from its containing an hundred families, or from its furnishing an hundred able men for the king's wars. After king Alfred's dividing this kingdom into counties, and giving the government of each county to a sheriff, these counties were divided into hundreds, of which the constable was the chief officer. The grants of hundreds were at first made by the king to particular persons: but they are not now held by grant or prescription, their jurisdiction being devolved to the county-court; a few of them only excepted, that have been by privilege annexed to the crown, or granted to some great subjects, and still remain in the nature of a franchise.

Hundred *Court.* This is only a larger Court-*Baron*, being held for all the inhabitants of a particular hundred instead of a manor. The free suitors are here also the judges, and the steward the register, as in the case of a court-baron. It is likewise no court of record; resembling the former in all points, except that in point of territory it is of a greater jurisdiction.

Hundred *weight*, an hundred and twelve pounds avoirdupois.

HU'NDRETH. *a.* (hunꝺꞃeonꞇeoᵹoꞃa, Sax.) The ordinal of a hundred.

HUNDSRUCH, a district of Germany, in the circle of Upper Rhine, situate between the Rhine, the Moselle, and the Nahe.

HUNG. The pret. and part. pass. of hang.

HUNGARY, a kingdom of Europe, the greatest part of which was anciently called *Pannonia.* It had the name of *Hungary* from the Huns, a Scythian or Tartar nation, who subdued it in the ninth century. It lies between the 18th and 22d degrees of east long. and betwixt the 45th and 49th degrees of north lat. being bounded on the north by the Carpathian mountains, which separate it from Poland; to the south, by Savia, and the river Drave, which separates it from Sclavonia; to the west, by Moravia, Austria, and Stiria; and to the east, by Wallachia and Transylvania. It is about 240 miles in length, and 235 in breadth; and is divided into the Upper and Lower Hungary, the former being that part which lies towards the east, and the latter that which lies towards the west. To these may be added the Bannat of Temeswar, incorporated into the kingdom of Hungary, in 1778. Hungary formerly included Transylvania, Sclavonia, Dalmatia, Servia, Wallachia. The principal rivers are the Danube, Sæave, Drave, Tresse, Maros, Raab, and Waag. The air is unhealthy, occasioned by the lakes and bogs. This country abounds in all the necessaries of life, and the wine, especially that called Tokay, is excellent. There are mines of gold, silver, copper, and iron; and they have such plenty of game, that hunting is allowed to all. The inhabitants are well-shaped, and brave; but haughty and revengeful. The population, including that of Transylvania, is estimated at nearly eight millions. The kingdom of Hungary can easily raise an army of 100,000 men. Their horsemen, are called Huzzars, and their footmen Heydukes. The government is hereditary in the house of Austria. No country is better supplied with mineral waters, and baths; and those of Buda, when the Turks were in possession of it, were reckoned the finest in Europe. Presburg is the capital of Upper Hungary; and Buda of the Lower. There are five languages spoken in this country, viz. the Hungarian, which, like the people, is of Scythian origin, and has little or no affinity with any European tongue; the German, Sclavonian, Wallachian, and Latin. The last is spoken, not only by the better sort, but also by the common people, though very corruptly. The people called *Zigduns* have also a particular jargon. Christianity was planted in Hungary in the ninth and tenth centuries. In the sixteenth the reformation made a great progress in it; but at present though the Roman catholics hardly make a fourth part of the inhabitants, their religion is predominant, the Protestants enjoying only a bare toleration. Besides several sects of Protestants, here are also great numbers of the Greek church and Jews; the last pay double taxes of all kinds. Besides Jesuits colleges and other convents, there are several universities of the Roman Catholics. The Lutherans also and Calvanists have their gymnasiums and schools, but under divers restrictions.

HUNGARY-Water, is spirit of wine distilled upon rosemary, and which therefore contains its only and strong-scented essence (see Pharmacy). To be really good says Professor Beckmann, the spirit of wine ought to be very strong, and the rosemary fresh; and if that be the case, the leaves are as proper as the flowers, which, according to the prescription of some, should only be taken. It is likewise necessary that the spirit

of wine be distilled several times upon the rosemary; but that process is too troublesome and expensive to admit of this water being disposed of at the low price it is usually sold for; and it is certain, that the greater part of it is nothing else than common brandy, united with the essence of rosemary in the simplest manner. In general it is only mixed with a few drops of the oil. For a long time past, this article has been brought to us principally from France, where it is prepared, particularly at Beaucaire, Montpellier, and other places in Languedoc, in which that plant grows in great abundance.

The name Hungary-water seems to signify, that this water, so celebrated for its medicinal virtues, is an Hungarian invention; and we read in many books, that the receipt for preparing it was given to a queen of Hungary by a hermit; or, as others say, by an angel, who appeared to her in a garden, all entrance to which was shut, in the form of a hermit or a youth. Some call the queen St. Isabella; but those who pretend to be best acquainted with the circumstance, affirm, that Elizabeth, wife of Charles Robert king of Hungary, and daughter of Uladislaus II. king of Poland, who died in 1380 or 1381, was the inventress. By often washing with this spirit of rosemary, when in the 70th year of her age, she was cured, as we are told, of the gout and an universal lameness; so that she not only lived to pass 80, but became so lively and beautiful, that she was courted by the king of Poland, who was then a widower, and who wished to make her his second wife.

The Professor justly considers this story as a ridiculous fable. "It appears to me (says he) most probable, that the French name *l' eau de la reine d' Hongrie*, was chosen by those who, in latter times, prepared spirit of rosemary for sale, in order to give greater consequence and credit to their commodity; as various medicines, some years ago, were extolled in the gazettes under the title of Pompadour, though the celebrated lady, from whose name they derived their importance, certainly neither ever saw them nor used them."

HU'NGER. *s.* (hunȝer, Saxon). 1. Desire of food; the pain felt by fasting. (*Arbuthnot*). 2. Any violent desire. (*Decay of Piety*).

Hunger. *Fames.* This function is classed by physiologists under the head of natural actions. It is a sensation in the stomach, caused by the irritation of the gastric juice, inducing a desire for food.

To prevent the calamity of famine and the evils of excessive hunger, at sea; it has been proposed by Dr. Lind, that the powder of salep should constitute part of the provisions for every ship's company. This powder and portable soup, dissolved in boiling water, form a rich thick jelly; and an ounce of each of these articles furnishes one day's subsistence to a healthy full-grown man. Indeed, from Dr. Percival's experiments it appears that salep contains more nutritious matter, in proportion to its bulk, than any other vegetable production now used as food. It has the property also of concealing the nauseous taste of salt-water; and consequently may be of great advantage at sea, when the stock of fresh-water is so far consumed that the mariners are put upon short allowance. By the same mucilaginous quality, it covers the offensiveness, and even in some measure corrects the acrimony of salted and putrescent meats. But, as a preservative against hunger, salep would be most efficacious combined with an equal weight of beef suet. By swallowing little balls of this lubricating compound at proper intervals, the coats of the stomach would be defended from irritation: and as oils and mucilages are highly nutritive, of slow digestion, and indisposed to pass off by perspiration, they are peculiarly well adapted to support life in small quantities. This composition is superior in simplicity, and perhaps equal in efficacy, to the following one, so much extolled by Avicenna the celebrated Arabian physician; to whom we are indebted for the introduction of rhubarb, cassia, tamarinds, and senna, into the materia medica. "Take sweet almonds and beef suet, of each one pound; of the oil of violets two ounces; and of the roots of marsh mallows one ounce: bray these ingredients together in a mortar, and form the mass into boluses, about the size of a common nut." Animal fat is singularly powerful in assuaging the most acute sensations of thirst, as appears from the narrative of the sufferings experienced by those who were confined in the black hole at Calcutta. A hundred and forty-six persons, exhausted by fatigue and military duty, were there thrust together into a chamber of 18 cubic feet, having only two windows, strongly barred with iron, from which, in a close sultry night, and in such a climate as that of Bengal, little or no circulation of fresh air could be enjoyed. In a few minutes, these unhappy wretches fell into so profuse a perspiration, that an idea can hardly be formed of it; and this was succeeded by a raging thirst, which increased in proportion as the body was drained of its moisture. Water! Water! became the universal cry; and an old soldier on the outside, through pity furnished them with a few skinfuls of it. But these scanty supplies, like sprinklings on the fire, served only to feed and increase the flame. From this experience of its effects, Mr. Holwell, their chief, determined to drink no more; and kept his mouth moist by sucking the perspiration out of his shirt sleeves, and catching the drops as they fell from his head and face. "You cannot imagine (says he) how unhappy I was if any of them escaped me." He came into the prison without his coat, the season being too hot to bear it: and one of his miserable companions, observing the

expedient he had hit upon of allaying his thirst, robbed him from time to time of a considerable part of his store. This plunderer, whom he found to be a young gentleman in the service of the East India Company, afterwards acknowledged, that he owed his life to the many comfortable daughts which he derived from him. Before Mr. Holwell adopted this mode of relief, he had attempted, in an ungovernable fit of thirst to drink his own urine: but it was so intensely bitter, that a second taste could not be endured; whereas, he assures us, no Bristol water could be more soft and pleasant than this perspiration. And this, we may presume consisted chiefly of animal fat, melted by excessive heat, and exuding from the cellular membranes through the pores of the skin.

Persons who have been accustomed to animal food, are soon reduced when supplied only with the farinacea. Several years ago, to determine the nutritive powers of different substances, an ingenious young physician, as Dr. Percival informs us, made a variety of experiments on himself, to which he unfortunately fell a sacrifice. He lived a month upon bread and water; and under this regimen of diet he every day diminished much in his weight. But, in 1784, a student of physic at Edinburgh confined himself for a longer space of time to a pint of milk and half a pound of white bread daily: and he assured our author, that he passed through the usual labours of study and exercise without feeling any decay of health or strength, and without any sensible loss of bulk. The cutaneous, urinary, and alvine excretions, were very scanty during the whole period; and the discharge of fæces occured only once in a week. In this case the oily and coagulable parts of the milk probably furnished a larger proportion of aliment, and at the same time contributed to check the waste of perspiration and other discharges; for oleaginous substances are retained long in the body by their vicidity. Dr. Russel, in his Natural History of Aleppo, relates, that in those seasons when oil abounds, the inhabitants, by indulgence in it, are disposed to fever, and affected with infarctions of the lungs; maladies which indicate both retention and obstruction. Milk has been suspected by some of producing similar effects, though in a slighter degree; and the free use of it has been on this account forbidden to asthmatics.

Gum arabic might be a good substitute for salep in the composition already recommended; and as it will give us such firmness to mass as to require manducation, the saliva, by this means separated and carried into the stomach, would further contribute to assuage the sensations both of hunger and of thirst. This gum, combined with sugar and the white of eggs, has been lately extolled in France, under the name of *patigumo*, as a remedy for catarrhal defluxions. Dr. Percival has seen cakes made of these ingredients, and thinks that they might be very well applied to the purpose of obviating hunger. They are not perishable in the hottest climates, may be carried about the person with convenience, and, though very tough, are pleasant to the taste. In the formula by which they are made, the proportion of sugar is too large, and that of gum arabic too small, if the mass be intended to assuage the cravings of appetite. According to our author's information, the receipt is as follows: "Take fine sugar four ounces, and of gum arabic one ounce; levigate them well together; and add half an ounce of rose-water, and of the white of eggs a suffiquantity."

To HUNGER. *v. n.* (from the noun). 1. To feel the pain of hunger (*Cowley*). 2. To desire with great eagerness (*Milton*).

HU'NGERBIT. HUNGERBITTEN. *a.* (*hunger* and *bit*.) Pained or weakened with hunger (*Milton*).

HUNGERFORD, a town in Berkshire, with a market on Wednesdays. It is seated on the Kennett, and noted for the best trout and Crawfish in England. Lat. 51. 26. N. Lon. 1. 26. W.

HU'NGERLY. *a.* (from *hunger*). Hungry; in want of nourishment (*Shakspeare*).

HUNGERLY. *ad.* With keen appetite (*Shakspeare*).

HU'NGERSTARVED. *a.* Starved with hunger; pinched by want of food. (*Dryden*).

HU'NGRED. *a.* (from *hunger*). Pinched by want of food (*Bacon*).

HU'NGRILY. *a.* (from *hungry*). With keen appetite.

HU'NGRY. *a.* (from *hunger*). 1. Feeling pain from want of food (*Locke*). 2. Not fat; not fruitful; not prolific; more disposed to draw from other substances than to impart to them (*Mortimer*).

HUNKS. *s.* (*hunskur*, sordid, Islandic). A covetous sordid wretch; a miser. (*Addison*).

HUNMANBY, a town in the E. Riding of Yorkshire, with a market on Tuesday's. Lat. 54. 12 N. Lon. 0. 12. W.

HUNNINGUEN, a fortified town of France, in the department of Upper Rhine. Lat. 47. 40. N. Lon. 11. 40. E.

HUNNS, a fierce and savage nation, who formerly inhabited that part of Sarmatia bordering on the Palus Mæotis and the Tanais, the ancient boundary between Europe and Asia. Their country, as described by Procopius, lay north of mount Caucasus, which, extending from the Euxine to the Caspian Seas, parts Asiatic Sarmatia from Colchis, Beria, and Albania; lying on the isthmus between the two seas above mentioned. Here they resided, unknown to other nations, and themselves ignorant of other countries, till the year 376. At this time, an hind pursued by the hunters, or, according to some authors, an ox stung by a gad-fly, having passed the marsh, was followed by some hunns to the other side,

where they discovered a country much more agreeable than their own. On their return, having acquainted their countrymen with what they had seen, the whole nation passed the marsh, and, falling upon the Alans, who dwelt on the banks of the Tanais, almost exterminated them. They next fell upon the Ostrogoths, whom they drove out of their country, and forced to retire to the plains between the Borysthenes and the Tanais, now known by the name of *Podolia*. Then attacking the Visigoths, they obliged them to shelter themselves in the most mountainous parts of their country; till at last the Gothic nations, finding it impossible to withstand such an inundation of barbarians, obtained leave from the emperor Valens to settle in Thrace.

The Hunns thus became masters of all the country between the Tanais and Danube in 376, were they continued quietly till the year 388, when great numbers of them were taken into the pay of Theodosius I.; but, in the mean time, a party of them, called the *Nephthalite or White Hunns*, who had continued in Asia, over-ran all Mesopotamia, and even laid siege to Edessa, where they were repulsed with great slaughter by the Romans. The European Hunns frequently passed the Danube, committing the greatest ravages in the western empire; sometimes they fell upon the eastern provinces, where they put all to fire and sword. They were often defeated and repulsed by the Romans, but the empire was now too weak to subdue or confine them from making excursions; so that they continued to make daily encroachments, and became every day more formidable than before. In 441, the Hunns, under Attila, threatened the western empire with total destruction. This monarch, having made himself master of all the northern countries from the confines of Persia, to the banks of the Rhine, invaded Mæsia, Thrace, and Illyricum; where he made such progress, that the emperor, not thinking himself safe in Constantinople, withdrew into Asia. Atilla then broke into Gaul, where he took and destroyed several cities, massacring the inhabitants with the greatest cruelty. At last he was driven out with great slaughter by Aetius the Roman general and Theodoric king of the Goths, and could never afterwards make any great progress. About the year 452 or 453 Atilla died, and his kingdom was immediately split into a number of small ones by his numerous children, who waged perpetual war with each other. The Hunns then ceased to be formidable, and became daily less able to cope with the other barbarous nations whom Attilla had kept in subjection. Still, however, their dominion was considerable; and in the time of Charles the Great they were masters of Transylvania, Wallachia, Servia, Carniola, Carinthia, and the greater part of Austria, together with Bosnia, Sclavonia, and that part of Hungary which lies beyond the Danube. In the year 776, while Charles was in Saxony, two princes of the Hunns, Caganus and Jugunus, sent ambassadors to him, desiring his friendship and alliance. Charles received them with extraordinary marks of friendship, and readily complied with their request. Not long after this, however, they formed an alliance with Taffila, duke of Bavaria, in consequence of which, Charles took such measures as soon exterminated them; nor did they ever afterwards so far recover themselves as to appear as a distinct nation.

To HUNT, *v. a.* (huntian, Saxon.) 1. To chase wild animals (*Addison*). 2. To pursue; to follow close (*Hervey*). 3. To search for (*Spenser*). 4. To direct or manage hounds in the chase (*Addison*).

To Hunt, *v. n.* 1. To follow the chase (*Shakspeare*). 2. To pursue or search (*Locke*).

Hunt. *s.* (from the verb.) 1. A pack of hounds (*Dryden*). 2. A chase (*Shakspeare*). 3. Pursuit (*Shakspeare*).

HU'NTER. *s.* (from *hunt.*) 1. One who chases animals for pastime or food (*Milton*). 2. A dog that scents game or beasts of prey (*Shakspeare*).

Hunter, a horse peculiarly appropriated to hunting, or the sport of the chase. The horses now denominated Hunters, are mostly three parts, or altogether blood breed: for the great number of blood horses not turning out winners in races, as well as those not trained for the turf, come of course to the hunting stables, and keep up a constant supply. A hunter for constant use with fleet hounds, should be well bred on both sides; not less than five years old off; from 15 hands and an inch, to 15 three, and 16 hands high: large and heavy horses, in deep or hilly countries, frequently tire themselves. To be handsome, he should be strong in his frame, short in his joints, firm in his fetlocks, quick in his eye, and alert in his action. He should have a light airy head, wide nostrils, prominent lively eye, slight curve in the crest, and long neck; he should be wide in the breast, deep in the chest, high in the withers, straight in the spine, short in the back, round in the barrel, full in the flank, the last rib coming well up to the point of the hip-bone, his loins wide, and rather circular than flat; the tail should be high, and well set on, in nearly a direct line from the back, and not drooping below the rump: there should be considerable strength and substance in the thighs, and a prominent muscular swell in the exterior of the gaskins; a great length from the hip-bone to the hock, and small length thence to the fetlock, which should be nearly round, and well united; the pasterns should be rather short than long; fore-legs straight, and upright; hoofs black, and of a strong firm

texture. The internal virtues should be courage, temper, and pliability of disposition.

The next great qualification to speed and temper in a hunter, is the property of leaping, both standing and flying. One common error in teaching horses to leap, is the use of the whip when they are first brought to the bar, in order to expedite what cannot be proceeded upon with too much kindness and circumspection. Young horses driven to a bar with a whip, and once alarmed, are sometimes prevented from becoming good standing leapers as long as they live. The bar should never be less than three feet from the ground; if lower, it only induces the horse to attempt it with one foot, as if to walk or scramble over it, which is a bad habit to acquire: he should never be permitted to make an effort till taught to rest entirely upon his haunches, and to raise slowly and gradually both his fore feet at the same moment.

Nothing can be more absurd than the practice of clothing the bar with bushes of furze, under the pretence of making the horse clear his leap; a young horse is almost always terrified at approaching the bar, and when compelled to take it, or rather when driven over it, he exhibits a jump of fear and agitation; rather than a cool, temperate, and steady leap of safety, fit to qualify him for the field. A horse can only be made a good standing leaper, by affording him ample time to measure his leap before he attempts it; that is, to observe its height, and take time for the bend of his knees, the contraction of his legs, and his own general spring, in order to cover the leap with certainty; and this a well-taught horse, of tolerable temper, will generally do, if permitted to adopt his own plan, and use his own exertions. The proper covering for a leaping-bar should be either fern or clean wheat straw, well secured by a strong packthread, bound round in a kind of net-work, which is not only exceedingly durable, but being composed of articles to which the horse is so accustomed, he naturally approaches it, if gently used, and patiently encouraged, without the least fear or agitation.

Much depends upon getting a hunter into good condition for the field: his speed, his health, and even his existence, are equally concerned in it. When taken up from his summer's run at grass, which every perfect hunter is entitled to, he should go through his regular course of physic; the strength and number of doses to be regulated by his accumulation of flesh, and general appearance: if in a fair, good, clean state, not loaded in substance, and perfectly clear in the skin, two doses may be sufficient.

Great care should be paid to a hunter after the chase is over, and if it have been severe, he should not soon be brought into similar exertions. A horse is best recovered from the effect of over fatigue by a patient walking, gentle exercise upon the turf, and patient friction in the stable.

Hunter. (Dr. William), a celebrated anatomist, was born at Kilbride, in Lanerkshire in 1718. His father, was a farmer, and designed him for the Church, but an acquaintance with Dr. Cullen induced him to adopt the profession of physic; accordingly he went and resided with that gentleman three years. In 1740 he went to Edinburgh, where he followed his studies with intense application, and the year following visited London, soon after which he was taken by Dr. James Douglas into his house as a dissecter and as tutor to his son. In 1746 he succeeded Mr. Samuel Sharpe as lecturer to a private society of surgeons in Covent-garden, and the year following he was admitted a member of the corporation of surgeons. In 1750 he obtained his doctor's degree from Glasgow, and entered into an extensive line of practice as a physican, particularly in midwifery. In 1762 he was appointed physician-extraordinary to the queen, and the same year published his Medical Commentaries. In 1767 he was chosen a fellow of the royal society, and furnished the transactions of that body with many interesting papers. In 1768 he was appointed by the king professor of anatomy to the royal academy, which office he discharged with great reputation, adapting his anatomical knowledge to the objects of painting and sculpture. In 1781 he succeeded Dr. Fothergill as president of the society of physicians in London, and his name being now universally spread throughout Europe he was chosen member of some foreign societies. Dr. Hunter formed a splendid anatomical museum at his house in Windmill-street, at an immense expence; after which he extended his collection to natural history, learning, and science. He soon became possessed of a magnificent treasure of Greek and Latin books, a cabinet of ancient medals, and a large stock of shells, corals, and other curious productions. This museum he bequeathed at his death, which happened in 1783, to his nephew Dr. Baillie, and Mr. Cruikshank, for 30 years, after which it is to go to the university of Glasgow. His greatest performance is the Anatomy of the Gravid Uterus, contained in 34 capital plates, and dedicated to the king. After his death, appeared an Anatomical Description of the Human Gravid Uterus and its Contents, by the late W. Hunter, M.D. 4to. 1795.

Dr. Hunter was regularly shaped, but of a slender make, and rather below a middle stature. His manner of living was extremely simple and frugal, and the quantity of his food was small as well as plain. He was an early riser; and when business was over, was constantly engaged in his anatomical pursuits, or in his museum. There was something very engaging in his manner and address; and he had such an appearance of attention to his patients, when he was

making his inquiries, as could hardly fail to conciliate their confidence and esteem. In consultation with his medical brethren, he delivered his opinions with diffidence and candour. In familiar conversation he was cheerful and unassuming. As a teacher of anatomy, he became most deservedly celebrated. He was a good orator; and having a clear and accurate conception of what he taught, he knew how to place in distinct and intelligible points of view the most abstruse subjects of anatomy and physiology. Among other methods of explaining and illustrating his doctrines, he used frequently to introduce some apposite story or case that had occurred to him in his practice; and few men had acquired a more interesting fund of anecdotes of this kind, or related them in a more agreeable manner.

Hunter (John), the younger brother of the preceding, was born in 1728, and brought up to a mechanical employment, of which being tired, he made an offer to the doctor to become his assistant, and this being accepted, he came to London in 1748. In 1749 Mr. Cheselden permitted him to attend at Chelsea Hospital, and he there learnt the rudiments of surgery. In 1751 he became a pupil at St. Bartholomew's, and he afterwards attended St. George's Hospital, where in 1756 he was appointed house-surgeon. About this time he was admitted by his brother to a partnership in his lectures. He laboured for ten years on human anatomy, and not only made himself master of the science as it then stood, but also added to it several important discoveries. He proceeded further in the examination of other animals, and this laid the foundation of his collection of comparative anatomy. In 1760 he was appointed an army surgeon, and went in that capacity to Bellisle and Portugal. On his return to England he fixed his residence in London, where he taught anatomy and surgery with the highest reputation. In 1767 he was admitted fellow of the Royal Society; and the year following his brother gave up to him his house in Jermyn-street. In 1768 he was chosen one of the surgeons of St. George's Hospital. In 1771 he married Miss Home, by whom he had two sons and two daughters. In 1776 he was appointed surgeon-extraordinary to his majesty. His collection having become extremely large, he purchased the lease of a large house in Leicester-square, and erected a building adjoining to it for the purpose of a museum. In 1790 he succeeded Mr. Adair as inspector-general of hospitals, and surgeon-general of the army. This indefatigable and extraordinary man, to whom science is under the deepest obligations, dropped down dead suddenly in St. George's Hospital, October 16, 1793. His contributions to the Philosophical Transactions of the Royal Society were numerous and interesting. His other works are, 1. A treatise on the Natural History of the Human Teeth, 4to.; 2. A second part of this treatise in 1778; 3. A treatise on the Venereal Disease, 4to. 1786; 4. Observations on the Animal Economy, 4to. 1786. 5. A treatise on the Blood, Inflammation, and Blood-shot Wounds, 4to.

Mr. Hunter was of a short stature, uncommonly strong and active, very compactly made, and capable of great bodily exertion. His countenance was animated, open, and in the latter part of his life deeply impressed with thoughtfulness. When his print was shown to Lavater, he said, "That man thinks for himself." In his youth he was cheerful in his disposition, and entered into youthful follies like others of the same age; but wine never agreed with his stomach; so that after some time he left it off altogether, and for the last twenty years drank nothing but water. His temper was very warm and impatient, readily provoked, and, when irritated, not easily soothed. His disposition was candid, and free from reserve, even to a fault. He hated deceit; and as he was above every kind of artifice, he detested it in others, and too openly avowed his sentiments. His mind was uncommonly active; it was naturally formed for investigation, and that turn displayed itself on the most trivial occasions, and always with mathematical exactness. What is curious, it fatigued him to be long in a mixed company which did not admit of a connected conversation; more particularly during the last ten years of his life. He required less relaxation than most other men; seldom sleeping more than four hours in the night, but almost always nearly an hour after dinner; this, probably, arose from the natural turn of his mind being so much adapted to his own occupations, that they were in reality his amusement, and therefore did not fatigue. In private practice he was liberal, scrupulously honest in saying what was really his opinion of the case, and ready upon all occasions to acknowledge his ignorance, whenever there was any thing which he did not understand.

HUNTING. A field sport in pursuit of various animals. The more common in our own country are the stag, the fox, and the hare. The term chase is applied to each of these sports: and the amusement, together with its various regulations, will be found under the articles *Chase*, *Fox-hunting*, *Hare-hunting*, and *Stag-hunting*.

The hunting profession, however, like most other professions, have a language peculiar to themselves. We cannot follow them through the whole of their vocabulary, but the following instances may serve as a general specimen:

1. For beasts as they are in company.—they say, a *herd* of harts, and all manner of deer. A *bey* of roes. A *sounder* of swine. A *rout* of wolves. A *richess* of martens. A *brace* or *lensh* of bucks, foxes, or hares. A *couple* of rabbits or coneys.

2. For their lodging.—A hart is said to *harbour*. A buck *lodges*. A roe *beds*. A hare *seats* or *forms*. A coney *sits*. A fox *kennels*. A marten *trees*. An otter *watches*. A badger *earths*. A boar *couches*.—Hence, to express their dislodging, they say, *unharbour* the hart. *Rouse* the buck. *Start* the hare. *Bolt* the coney. *Unkennel* the fox. *Untree* the marten. *Vent* the otter, *Dig* the badger. *Rear* the boar.

3. For their noise at rutting-time.—A hart *belleth*. A buck *growns* or *troots*. A roe *bellows*. A hare *beats* or *taps*. An otter *whines*. A boar *freams*. A fox *barks*. A badger *shrieks*. A wolf *howls*. A goat *rattles*.

4. For their copulation.—A hart or buck goes to *rut*. A roe goes to *tourn*. A boar goes to *brim*. A hare or coney goes to *buck*. A fox goes to *clicketting*. A wolf goes to *match* or *make*. An otter *hunteth* for his kind.

5. For the footing and treading.—Of a hart, we say the *slot*. Of a buck, and all fallow-deer, the *view*. Of all deer, if on the grass, and scarce visible, the *foiling*. Of a fox, the *print*; and of other the like vermin, the *footing*. Of an otter, the *marks*. Of a boar, the *track*. The hare, when in open field, is said to *sore*; when she winds about to deceive the hounds, she *doubles*; when she beats on the hard highway, and her footing comes to be perceived, she *pricketh*: in snow it is called the *trace* of the hare.

6. The tail of a hart, buck, or other deer, is called the *single*. That of a boar, the *wreath*. Of a fox, the *brush* or *drag*; and tip at the end, the *chape*. Of a wolf, the *stern*. Of a hare and coney, the *seat*.

7. The ordure or excrement of a hart and all deer, is called *fewmets* or *fewmishing*. Of a hare, *crotiles*, or *crotising*. Of a boar, *lesses*. Of a fox, the *billiting*; and of other the like vermin, the *fuants*. Of an otter, the *spraints*.

8. As to the attire of a deer, or parts thereof, those of a stag, if perfect, are the *bur*, the *pearls*, the little *knobs* on it, the *beam*, the *gutters*, the *antler*, the *sur-antler*, *royal*, *sur-royal*, and all at top the *croches*. Of the buck, the *bur*, *beam*, *brow-antler*, *black-antler*, *advancer*, *palm*, and *sellers*. If the croches grow in the form of a man's hand, it is called a *palmed-head*. Heads bearing not above three or four, and the croches placed aloft, all of one height, are called *crowned-heads*. Heads having double croches, are called *forked-heads*, because the croches are planted on the top of the beam like forks.

9. They say, a *litter* of cubs, a *nest* of rabbits, a squirrel's *dray*.

10. The terms used in respect of the dogs, &c. are as follow:—Of grey-hounds, two to make a *brace*; of hounds, a *couple*. Of grey-hounds, three make a *leash*; of hounds, a *couple* and *half*.—They say, *let slip* a grey-hound; and, *cast-off* a hound. The string, wherein a grey-hound is led, is called a *leash*; and that of a hound, a *lyome*. The grey-hound has his *collar*, and the hound his couples. We say a *kennel* of hounds, and a *pack* of beagles.

In the kennels or packs they generally rank them under the heads of *enterers*, *drivers*, *flyers*, *tyers*, &c.

When the hounds, being cast off, and finding the scent of some game, begin to open and cry, they are said to *challenge*. When they are too busy ere the scent be good, they are said to *babble*. When too busy, where the scent is good, to *bawl*. When they run it endwise orderly, holding in together merrily, and making it good, they are said to be in *full cry*. When they run along without opening at all, it is called *running mute*.

When spaniels open in the string, or a grey-hound in the course, they are said to *lapse*.

When beagles bark and cry at their prey, they are said to *yearn*.

When the dogs hit the scent the contrary way, they are said to *draw amiss*.

When they take fresh scent, and quit the former chase for a new one, it is called *hunting change*.

When they *hunt* the game by the heel or track, they are said to *hunt counter*. The more common expression, however, is to say, they *run the heel*, and *ware heel*, accompanied with a crack of the whip, is the reprehension of the whipper-in. Indeed, these terms (of which see more under the article Terms) are more a matter of curiosity for their antiquity than their use, as many of them are now quite obsolete; for instance, the distinction between *pack* and *kennel*, as pack is used for every species of hounds.

When the chase goes off, and returns again, traversing the same ground, it is called *hunting a foil*.

When the dogs run at a whole herd of deer, instead of a single one, it is called *running riot*.

Dogs set in readiness where the game is expected to come, and cast off after the other hounds are passed, are called *relay*. If they be cast off ere the other dogs be come up, it is called *vountlay*.

When, finding where the chase has been, they make a proffer to enter, but return, it is called a *blemish*.

A lesson on the horn to encourage the hounds, is named a *call*, or a *recheat*. That blown at the death of a deer, is called the *mort*. The part belonging to the dogs of any chase they have killed, is the *reward*.

Hunting-cap, for the use of huntsmen; a cap made of leather, covered with black velvet, fitting close to the head behind, and having a semicircular projection before, for the protection of the face in case

of falls, as well as in passing through strong coverts during the chase. In the language of sportsmen, such a cap is termed a *dasher*, and the wearer is supposed to have made a resolution that he will never swerve from any difficulty that may occur, or refuse any leap in the field, but takes them all in stroke.

Hunting-horn. *s.* (*hunting* and *horn.*) A bugle; a horn used to cheer the hounds (*Prior*).

Hunting-whip, a whip employed in the chase, of different lengths in the handle or stock; having at one end a long thong and lash, to assist occasionally in managing the hounds; and at the other, a hook, hammer, or claw, for the purpose of holding or opening gates.

HUNTINGDON, a town of England, and capital of the county to which it gives name, situated on a rising ground, near the river Ouse, said formerly to have had fifteen churches, all which were destroyed in Speed's time except three. In the reign of William the Conqueror, it was divided into four wards, and contained 256 burgesses. Near the town was a castle built by William the Conqueror, and considerably enlarged and strengthened by David I. king of Scotland, who was created earl of Huntingdon, by Henry I. on account of his marrying the widow of the former earl. There are at present only two churches. It was first incorporated by king John, but the magistrates, which consist of a mayor, aldermen, recorder, &c. act under the charter of Charles I. Huntingdon is a borough, and sends two members to the British parliament. The assizes for the county are held here; the market is on Saturday. Here are 356 houses, and 2035 inhabitants. Lat. 52. 17. N. Lon. 0. 5. W.

Huntingdon, a town of United America, in the state of Pennsylvania. Lat. 40. 26. N. Lon. 78. 2. W.

HUNTINGDONSHIRE, a county of England, bounded on the W. and N. W. by Northamptonshire, on the N. E. the E. and S. E. by Cambridgeshire, and on the S. W. by Bedfordshire. It extends 25 miles from N. to S. and about 20 from E. to W. in its broadest part. The principal rivers are the Ouse and Nen. The borders of the Ouse, which flows across the S. E. part, consist of fertile and beautiful meadows. The middle and western parts are finely varied in their surface, fertile in corn, and sprinkled with woods. The whole upland part was, in ancient times, a forest, peculiarly adapted for hunting, whence the name of the county took its rise. The N. E. part consists of fens, which join those of Ely. They are drained, so as to afford rich pasturage for cattle, and even large crops of corn. In the midst of them are some shallow pools, abounding with fish. The largest of these is a lake of considerable size, called Whittlesea Mere. The air is good, except in the fenny parts, which are agueish. Its chief commodities are corn, malt, and cheese; and they fatten abundance of cattle. It sends four members to parliament; and the high sheriff, who is chosen alternately from Cambridgeshire and Huntingdonshire, is sheriff of both counties at the same time. This county contains about 451,000 acres of land, 50,000 of which are uncultivated, including woodlands and lakes. It has 6976 houses, and 37,568 inhabitants. In 1801 it furnished 159 men to the national militia.

Huntingdon (Selina, countess of), the second daughter of Washington Shirley, second earl of Ferrers, was born in 1707, and married Theophilus earl of Huntingdon, in 1728, by whom she had four sons and three daughters. A dangerous illness brought her into a serious frame of mind, and on her recovery she devoted herself to religion, to the great surprise of the fashionable world. She became the patron of Mr. Whitfield, Mr. Romaine, and the calvinistic methodists in general. She opened her house in Park-street for the preaching of the gospel, and at length she erected chapels in various parts of the kingdom. She also built a college at Trevecca in Wales, for the purpose of educating serious young men for the ministry. Her labours were unwearied, her liberality extensive, and her whole deportment humble and pious: She died in 1791 (*Watkins*).

HU'NTRESS. *s.* (from *hunter.*) A woman that follows the chase (*Broome*).

HU'NTSMAN. *s.* (*hunt* and *man.*) 1. One who delights in the chase (*Waller*). 2. The servant whose office it is to manage the chase (*L'Estrange*).

Hu'ntsman. The person whose business it is to superintend every department of a hunting establishment, as well as to hunt the hounds.

"I will endeavour," says Mr. Beckford, "to describe what a good huntsman should be. He should be young, strong, active, bold, and enterprising; fond of the diversion, and indefatigable in the pursuit of it; he should be sensible and good-tempered; he ought also to be sober, exact, civil, and cleanly; he should be a good groom, and an excellent horseman; his voice should be strong and clear; and he should have an eye so quick, as to perceive which of his hounds carries the scent when all are running; and should have so excellent an ear, as always to distinguish the foremost hounds when he does not see them. He should be quiet, patient, and without conceit. Such are the excellencies which constitute a good huntsman. He should not, however, be too fond of displaying them, till necessity calls them forth. He should let his hounds alone, whilst they can hunt; and he should have genius to assist them, when they cannot.

"Were it usual to attend to the breed of our huntsmen, as well as to that of our hounds, I know no family that would furnish a better cross than that of the silent gentleman mentioned by the Spectator: a

female of his line, crossed with a knowing huntsman, would probably produce a perfect hare-hunter."

From the moment of throwing off, as well as during the progress of the chase, it is the peculiar province of the huntsman to be at the head of the hounds. The place he should endeavour to keep, when circumstances do not occur to prevent it, is parallel with the leading body of the hounds; in which situation he has opportunity to observe what hounds carry the scent; and if the scent fail, to know to a certainty how far they have brought it: as well as ample scope for the exertion of his authority, in preventing the horsemen from pressing too eagerly upon the hounds, by the cry of "Hold hard!" a signal that never can come with so much propriety from any voice as his own.

As in hare-hunting it is impossible to press the hounds on too little, so in fox-hunting it is impossible to press them on too much, at least while the scent is good; that failing, much should be left at first to their own exertions, and if these should not shortly succeed, the proper casts should be made with judgment, and without delay.

Not the least attention should be paid by a huntsman to any halloo unless the hounds are at fault; a huntsman taking his hounds from the chase, when running with a good scent, to a halloo, without much more than a common cause, ought to be dismissed from his office. Hounds are often hallooed too much, and too frequently permitted to obey it; the consequence is, they are no sooner at fault than they expect the cry; whence they are always upon the listen, and become more and more slack, particularly in covert. As long as hounds can carry on the scent, it must be absurd to take them off; but when, with all exertion, it cannot be recovered, it then becomes a duty to render them every assistance. Cases sometimes occur in opposition to every effort (particularly in covert) where the leading hounds, in running, get ahead of the huntsman, and much before the principal body of the pack; in such situation, the huntsman must surmount every intervening difficulty, and get to them as fast as he can, with such of the pack as he can collect, and leave the remainder to be hallooed forward, and brought along by the whipper-in.

HU'NTSMANSHIP. *s.* (from *huntsman.*) The qualifications of a hunter (*Donne*).

HU-QUANG, a province of the kingdom of China, in Asia, which has a great river called Yang, and Tsechiang, which runs across it from east to west. It is divided into the north and south parts, the former of which contains eight cities of the first rank, and sixty of the second and third; and the latter, seven of the first rank, and five of the second and third.

HURA. Sandbox-tree. In botany, a genus of the class monoecia, order monadelphia, male: ament imbricate; periauth truncate; corolless; filament cylindric, peltate at the top, surrounded with numerous anthers in pairs. Fem. calyxless; corolless; style funnel-form; stigma twelve-clift; capsule twelve-celled; seeds solitary. One species; a West Indian tree with branches, abounding in milky juice; rising about 25 feet high; the pods burst, when ripe, with violence, and scatter their seeds to a considerable distance.

HURDLES, in fortification, twigs of willows or osiers interwoven close together, sustained by long stakes, and unusually laden with earth. Hurdles, called also clays, are made in the figure of a long square; the length being five or six feet, and the breadth three, or three and a half: the closer they are woven, the better. They serve to render batteries firm, or to consolidate the passage over muddy ditches; or to cover traverses and lodgments, for the defence of the workmen, against the fire-works, or the stones that may be thrown against them.

Hurdles, in husbandry, certain frames, made either of split timber, or of hazel-rods wattled together, to serve for gates in inclosures, or to make sheepfolds, &c.

HURDS. *s.* The refuse of hemp or flax.

HURDWAR, a town of the province of Delhi, where the Ganges first enters the plains of Hindoostan. Lat. 29. 35. N. Lon. 78. 15. E.

To HURL. *v. a.* (from *hourlt*, to throw down; Islandic; or from *whirl.*) 1. To throw with violence; to drive impetuously. (*Ben Jonson*). 2. To utter with vehemence. (*hurler*, Fr. to make a howling noise.) Not in use (*Spenser*). 3. To play at a kind of game (*Carew*).

HURL. *s.* (from the verb.) Tumult; riot; commotion (*Knolles*).

HU'RLBAT. *s.* (*hurl* and *bat.*) Whirlbat.

HURLE, or whirl bone, among farriers, is situate in the centrical part of the hindquarter of a horse, midway between the hip-bone and the gaskin, and is at present more known by the name of round-bone. Notwithstanding the singular strength of its formation, and its peculiar junction with the lower extremity of the hip-bone, it is liable to injury from sudden turns or twists in too confined a space; an injury that should be particularly guarded against, as from the depth at which the bone is seated, no relief can be obtained, but by long and patient fomentation, succeeded when the inflammation has subsided, by tonic and stimulant lotions.

HU'RLER. *s.* (from *hurl.*) One that plays at hurling (*Carew*).

HU'RLERS, a number of large oblong stones, set in a kind of square figure near St. Clare, in Cornwall, so called from an odd opinion held by the common people, that they are so many men petrified, or changed into stones, for profaning the sabbath day by hurling the ball, an exercise for which

the people of that country have been always famous. They are probably ancient sepulchral monuments.

HU'RLWIND. *s.* (*hurl* and *wind.*) A whirlwind; a violent gust: not in use. (*San.*)

HU'RLY. } *s.* Tumult; commo-
HU'RLYBURLY. } tion; bustle. (*Shak.*)

HU'RON, a river of North America, which forms a communication between lake Huron and lake St. Clair.

HU'RON, a lake of North America, about a thousand miles in circumference, containing many islands and bays. It abounds in fish, the principal of which are trout and sturgeon. Lon. 80. 10. to 84. 30. W. Greenwich. Lat. 43. 30. to 46. 10. N.

HU'RRICANE. } *s.* (*huracan*, Spanish.)
HURRICA'NO. } A violent storm, such as is often experienced in the western hemisphere (*Dryden, Shakspeare*).

Hurricanes are frequent in the West Indies, where they make terrible ravages, by rooting up trees, destroying houses and shipping, and the like. The natives, it is said, can foretel hurricanes by the following prognostics: 1. All hurricanes happen either on the day of the full, change, or quarter of the moon. 2. From the unusual redness of the sun, the great stillness, and at the same time, turbulence of the skies, swelling of the sea, and the like, happening at the change of the moon, they conclude there will be a hurricane next full moon; and if the same signs be observed on the full moon, they may expect one next new moon. As to the cause of hurricanes, they undoubtedly arise from the violent struggle of two opposite winds. Now as the wind betwixt the tropics is generally easterly, and upon the sun's going back from the northern tropic, the western winds pour down with violence upon those parts, the opposition of these contrary winds cannot fail to produce a hurricane. Hurricanes shift not through all the points of the compass, but begin always with a north wind, veer to the east, and then cease; and their shifting between these two points is so sudden and violent, that it is impossible for any ship to veer with it; whence it happens that the sails are carried away, yards and all, and sometimes the masts themselves wreathed round like an osier.

HU'RRIER. *s.* (from *hurry.*) One that hurries; a disturber (*Chapman*).

To HU'RRY. *v. a.* (heȝȝian, to plunder, Sax.) To hasten; to put into precipitation or confusion; to drive confusedly (*Pope*).

To HU'RRY. *v. n.* To move on with precipitation (*Dryden*).

HU'RRY. *s.* (from the verb.) Tumult; precipitation; commotion (*Addison*).

HURST. *s.* (hyꞃꞅꞇ, Saxon.) A grove or thicket of trees (*Ainsworth*.

HURST-CASTLE, a castle in Hampshire, not far from Lymington. It is seated on the extreme point of a neck of land, which shoots into the sea towards the Isle of Wight, from which it is distant two miles. In this castle Charles I. was confined previously to his being brought to trial.

To HURT. *v. a.* preterit *I hurt;* part. pass. *I have hurt.* (hyꞃꞇ, wounded, Saxon.) 1. To mischief; to harm (*Milton*). 2. To wound; to pain by some bodily harm (*Walton*). 3. To damage; to impair (*Revelation*).

HURT. *s.* (from the verb.) 1. Harm; mischief (*Baker*). 2. Wound or bruise (*Hayward*). 3. Injury; wrong (*Ezra*).

HU'RTER. *s.* (from *hurt.*) One that does harm.

HUR'TERS, in fortification, small squared pieces of timber placed next to the parapet, to prevent its being injured by the wheels of gun-carriages.

HU'RTFUL. *a.* (*hurt* and full.) Mischievous; pernicious (*Dryden*).

HU'RTFULLY. *ad.* Mischievously.

HU'RTFULNESS. *s.* (from *hurtful.*) Mischievousness; perniciousness.

To HU'RTLE. *v. n.* (*heurteur*, French.) To clash; to skirmish; to run against any thing; to jostle (*Shakspeare*).

To HU'RTLE. *v. a.* To move with violence or impetuosity: obsolete (*Spenser*).

HU'RTLEBERRY. *s.* (*hiort bar*, Danish.) Bilberry; wortleberry.

HU'RTLESS. *a.* (from *hurt.*) 1. Innocent; harmless; innoxious; doing no harm (*Spenser*). 2. Receiviug no hurt.

HU'RTLESSLY. *ad.* Without harm. (*Sid.*)

HU'RTLESSNESS. *s.* (from *hurtless.*) Freedom from any pernicions quality.

HURTS, HEURTS, or HUERTS, in heraldry, are azure blue rundles.

HU'RTSICKLE, in botany, the bluebottle, or cyanus, so called because it is troublesome to cut down, and sometimes notches the sickle.

HUS, or HUSSU, a town of Turkey in Europe, in Moldavia, the see of a Greek bishop. Lat. 46. 35. N. Lon. 28. 34. E.

HU'SBAND. *s.* (*hossband*, house master, Dan.) 1. The correlative to wife; a man married to a woman (*Locke*). 2. The male of animals (*Dryden*). 3. An economist; a man that knows and practises the methods of frugality and profit. 4. A tiller of the ground, a farmer (*Dryden*).

To HU'SBAND. *v. a.* (from the noun.) 1. To supply with a husband (*Shakspeare*). 2. To manage with frugality (*Shakspeare*). 3. To till; to cultivate the ground with proper management (*Bacon*).

HU'SBAND AND WIFE, usually called baron and feme, are one person in law: that is, the very being or legal existence of the woman is suspended during the marriage, or at least is incorporated and consolidated into that of the husband, under whose wing, protection and cover she performs every thing. She is therefore called in our law French, a *feme covert*, that is, under the protection and influence of her husband, her baron, or lord; and her condition during her marriage is called her coverture.

A man cannot grant lands to his wife dur-

ing her coverture, nor any estate or interest to her, nor enter into covenant with her. But he may by his deed covenant with others for her use, as for her jointure, or the like; and he may give to her by devise or will, because the devise or will does not take effect till after his death. 1 Inst. 112.

All deeds executed by the wife, and acts done by her during her coverture, are void, except a fine, or the like matter of record, in which case she must be solely and secretly examined, that it may be known whether or no her act is voluntary. 1 Black. 444.

A wife is so much favoured in respect of that power and authority which her husband has over her, that she shall not suffer any punishment for committing a bare theft in company with, or by coercion of her husband. But if she commits a theft of her own voluntary act, or by the bare command of her husband, or is guilty of treason, murder, or robbery, in company with or by coercion of her husband, she is punishable as much as if she was sole; because of the odiousness and dangerous consequences of these crimes. 1 Haw. 2.

By marriage the husband has power over his wife's person; and the courts of law still permit an husband to restrain a wife of her liberty, in case of any gross misbehaviour. But if he threatens to kill her, &c. she may make him find surety for the peace, by suing a writ of supplicavit out of chancery, or by preferring articles of the peace against him in the court of king's bench; or she may apply to the spiritual court for a divorce propter sævitatem.

The husband by marriage obtains a freehold in right of his wife, if he takes a woman to wife that is seized of a freehold; and he may make a lease thereof for 21 years, or three lives, if it is made according to the statute. 32 Hen. VIII. c. 28.

The husband also gains a chattel real, as a term for years, to dispose of if he pleases by grant or lease in her life-time, or by surviving her: otherwise it remains with the wife. And upon execution for the husband's debt, the sheriff may sell the term during the life of the wife. 1 Inst. 351.

The husband also by the marriage has an absolute gift of all chattels personal in possession of the wife in her own right, whether he survives her or not. But if these chattels personal are choses in action, that is, things to be sued for by action, as debts by obligation, contract, or the like, the husband shall not have them, unless he and his wife recover them. 1 Inst. 351.

By custom in London, a wife may carry on a separate trade; and as such, is liable to the statutes of bankruptcy with respect to the goods in such separate trade, with which the husband cannot intermeddle. Burr. 1776.

If the wife is indebted before marriage, the husband is bound afterwards to pay the debt, living with the wife; for he has adopted her and her circumstances together. 1 Black. 143. But if the wife dies, the husband shall not be charged for the debt of his wife after her death, if the creditor of the wife does not get judgment during the coverture. 9 Co. 72.

The husband is bound to provide his wife necessaries; and if she contracts for them, he is obliged to pay for the same; but for any thing besides necessaries, he is not chargeable.

And also if a wife elopes, and lives with another man, the husband is not chargeable even for necessaries; at least if the person who furnishes them is sufficiently apprized of her elopement. 1 Black. 442.

A man having issue by his wife born alive, shall be tenant by the courtesy of all the lands in fee simple, or fee tail general, of which she shall die seized. Litt. 52.

And after her death he shall have all chattels real: as the term of the wife, or a lease for years of the wife, and all other chattels in possession; and also, all such as are of a mixed nature (partly in possession and partly in action), as rents in arrear, incurred before the marriage or after: but things merely in action, as of a bond or obligation to the wife, he can only claim them as administrator to his wife, if he survives her. Wood. b. 1. c. 6.

If the wife survives the husband, she shall have for her dower the third part of all his freehold lands: so she shall have her term for years again, if he has not altered the property during his life; so also she shall have again all other chattels real and mixed; and so things in action, as debts, shall remain to her, if they were not received during the marriage. Id.

But if she elopes from her husband, and goes away with her adulterer, she shall lose her dower, unless her husband had willingly, without coercion ecclesiastical, been reconciled to her, and permitted her to cohabit with him. 1 Inst. 32.

Husband Land, a term used in Scotland for a portion of land containing six acres of sock and scythe land; that is, of land that may be tilled with a plough and mown with a scythe.

HU'SBANDLESS. *a.* (from *husband.*) Without a husband (*Shakspeare*).

HU'SBANDLY. *a* (from *husband.*) Frugal; thrifty (*Tusser*).

HU'SBANDMAN. *s.* (*husband* and *man.*) One who works in tillage (*Broome*).

HU'SBANDRY. *s.* (from *husband.*) 1. Tillage; manner of cultivating land. (*Shak.*) 2. Thrift; frugality; parsimony (*Swift*). 3. Care of domestick affairs (*Shakspeare*).

Husbandry, (from *haus*, a house and *bonda*, Runick, a master; q. e. d. house-mastery, house-superintendance, house-government; in which last sense it is directly synonymous with the Greek term οικονομια, or *economy*, a term even in modern times not unfrequently applied to the concerns of husbandry). Rural Economics: General Culture.

HUSBANDRY.

This is a most important subject, not only as being the earliest study and pursuit of man, in the patriarchal ages, but as affording to every country, in its collective state, its best riches, health and happiness, whether physical, moral or political.

As soon as mankind form themselves into settled society, necessity compels them to stimulate the fertility of the earth by some kind of culture; and this, whether they derive their food from vegetables alone, or from animal nutriment in conjunction with vegetables. Hence husbandry becomes the basis of civilized life, nor are its effects less delightful than politically beneficial. Every eye is charmed wiih the smiling verdure of a well-cultivated field: every heart is gladdened at the prospect of a luxuriant harvest: the mind partakes of the general rapture of vallies crowned with herds, and the little hills with flocks, and readily enters into the chorus when they all shout and sing aloud for joy. Fortitude and industry, perseverance and patience, are required to undertake and execute the important labours of the field. The mind is perpetually led to look up for the co-operation of heaven: admiration is excited by the world, of wonders continually displayed in the phænomena of vegetation; and gratitude for the favours of that power and goodness by which they are produced. Hence the life of the agriculturist is adapted to generate and cherish the fairest of the human virtues.

But besides these virtues, agriculture is also calculated to exercise and exalt the talents of man. To know the nature and qualities of vegetable productions; to distinguish their peculiar habits; to understand what applications are proper, both to promote the growth of the useful, and discourage the noxious; to determine the seasons, soils and circumstances, suitable for all such applications; to be well informed in the natural history of the animal creation, so as to foster the animals useful to man, and to guard against the depredations of such as injure cultivated vegetables, are studies sufficient to give full scope to the intellectual powers: yet all these are requisite to form an accomplished husbandman.

An employment of such importance to society, and so honourable to the individual, it might have been presumed would have been generally embraced by all who aspire at distinction or honour; and in ancient times this was probably the case; for agriculture was then the occupation of rulers and legislators. But from an unhappy depravity, mankind, too soon, began to form false notions of honour: it was deemed more glorious to destroy than to comfort and preserve; to acquire possessions by brutal force, than by virtuous industry; and thus the arts, most beneficial to society, fell into contempt. The Spartans, those vandals of ancient Greece, glorying only in war-like atchievement, committed the cultivation of their lands to their enslaved Helots. The Romans, too, who in virtuous times, carefully cultivated their limited *jugera*, as soon as their manners were corrupted by the spoils of the surrounding nations they had subdued, abandoned the management of their native fields to slaves and parasites. The barbarous hordes that over-run Europe in later times, followed the same example. Destitute of knowledge, and impatient of instruction, they disdained to apply to the study of arts in which they were not fitted to excel. Leaving the cultivation of the soil to *villains*, whose minds were debased by slavery and oppression, they engaged solely in martial feats, or the chase, in the short intervals of their sanguinary quarrels. A rude people, averse to rational investigations, entered into civil transactions with the same dispositions. Stratagem and cunning became preferred to rectitude, and successful artifice best ensured applause. Hence prowess in the martial field, and superior address in civil intrigues, became the direct and only way to renown. As the offices which give play to the violent and corrupt passions, obtain the ascendancy over these in which strict virtue and genuine talents only are required, public opinion is perverted, and mischievous prejudices become prevalent.

From this inverted order of things, agriculture, the most innocent and important art to society, became for many ages held in far too low an estimation. Happily, however, the rays of truth have at length pierced the gross mists of prejudice and error; husbandry is no longer despised, and the cultivation of our native land is growing into a fashionable and philosophical pursuit.

Perhaps in our own country agriculture has, for some years, been more respectfully treated than in any other, unless we were to cross the Indian ocean, and to examine the attention which has almost immemorably been paid to it in China. One of the earliest promoters of this patriarchal study, and whose name will, we trust, be handed down with honour to the remotest antiquity, was the discerning Fitzherbert, a judge of the common pleas, who flourished near the beginning of the sixteenth century; who employed his pen most usefully, and in a most popular manner, upon agricultural subjects; and who, in consequence, excited a general taste, and emulation in agricultural pursuits. The example was shortly afterwards followed, almost, if not altogether, with equal success, by Sir Hugh Platt, who entered, with much scientific research, into the nature and constituent principles of different soils, and the means of improving them by different manures and composts. To him succeeded the unfortunate Gabriel Plattes, Bligh, Hartlib, Evelyn, and John Tull.

After the restoration of peace, by the treaty of Aix-la-Chapelle, the continent at large gave evident marks of attention to the same important subject. In France, more especially, we have many embryo efforts towards cultivating it upon just and rational principles. Different societies and academies were established in different parts of the kingdom, and prize questions proposed, in order to extend and improve the knowledge of husbandry; while the practical observations contained in the writings of the marquis de Tourbilly, tended probably in a still greater degree than all the rest, more to forward the general design.

In Switzerland the same methods were pursued; nor were exertions wanting to introduce approved systems of European husbandry into Russia: while Sweden, Denmark, Germany, and the different states of Italy, though extremely enfeebled by luxury, gave proofs of not being wholly inattentive to the agricultural art. Their progress has not, however, been rapid, or their improvements numerous.

But, notwithstanding these different sources from which agriculture has been promoted, the art is still far from having attained that degree of perfection which might have been expected from the great length of time that it has been cultivated; the reason of which would seem to be, that it has been practised without much regard to scientific principles, and consequently has derived few advantages from modern improvements in natural philosophy or chemistry. Vague and fortuitous experience has, till of late, contributed more to the present flourishing state of the art than any general principles deduced from the knowledge which we have lately acquired, either of the process of vegetation, or of the nature of soils. The skill thus fortuitously acquired, must, however, necessarily be partial, and mostly local; even the very terms employed by those who most eminently possess it, are generally of a vague and uncertain signification. Thus, clay is frequently mistaken for marle, marle for chalk, and the first again for loam. The philosophical enquiries which have been made on this important subject, have therefore not yet been sufficiently attended to by the practical farmer. Much useful information may, however, be derived from the researches of Du Hamel, and still more from the well-directed experiments of Mr. Tillet. The labours of the illustrious Bergman also deserve considerable attention. Black and Priestley, by their ingenious experiments, have likewise thrown new light on many parts of the subject: and the chemical theory of Lavoisier has led to the explanation of other circumstances which before seemed inexplicable. Valuable discoveries have also been made by Senebier and Ingenhoutz; and still fuller information to be conveyed by the enquiries of Hassenfraz.

In descending to the present day, we may, indeed, triumph in beholding philosophy and practice, rank and opulence, each equally contributing to bestow honour on the plough and the sheep-fold: the names of Kirwan, Ducy, and Sir Joseph Banks, among physiologists; of Kaims, Hunter, Anderson, Sinclair, and Young, among practical cultivators; of Coke, the duke of Norfolk, and the late as well as the present duke of Bedford, as well as an innumerable list of other noblemen and large landed proprietors, are sufficient to establish, most completely, the truth of this observation: while, to close the whole, his present majesty, in the purest spirit of patriotism, has devoted no small portion of his leisure from more serious concerns, to the same pleasant and recreating pursuit; and both by practice and patronage, has taken every opportunity of promoting its valuable interests.

The greater number of treatises on Husbandry are rendered complex, by their multiplicity of divisions and subdivisions, and by their connecting with it an introductory discussion of the philosophy or physiology of plants. The latter we shall entirely transfer to the article Physiology, to which the cultivator may turn at his leisure; and the former we shall reduce to three leading parts, under which we shall examine, progressively, the separate subjects that belong to them. These parts are Agriculture, or the preparation and management of the *Soil*: Cropping, or the growth and management of the *Vegetable Products*: and Breeding, or the growth and management of *Live Stock*.

PART I.

Agriculture,

Or the Preparation and Management of Soils.

Soils are of various kinds and properties, and hence a due attention to their nature and composition is a matter of the greatest importance, as without it, we can insure no increase, or at least none adequate to our labour.

Every soil, however, (at least the exceptions are too few to require notice,) is capable of producing plants of some kind or other; yet without cultivation it seldom yields more than a boundless profusion of weeds, plants of no use, or whose uses are unknown; or forests of massy timber, that require infinitely more labour to be cleared away, than the closest collection of the most obstinate and intractable weeds whatsoever. To know the nature of the soil which we are about to cultivate, it is first necessary, therefore, to rid it from these natural incumbrances: we shall then be able to examine its constituent principles, and to add to its productive power. This part of our subject, therefore, will demand a division into the following chapters:

1. Clearing the ground-plot.
2. The nature of the soil to be cultivated.
3. Improvement of the soil by composition.
4. Improvement of the soil by chemical and mechanical processes.
5. Agricultural powers and implements.

1. *Of clearing the ground-plot.*—All uncultivated land, whether high or low, dry or morassy, will be found, in a very considerable degree, choaked up with unprofitable weeds or impenetrable woods. Our own country, indeed, and especially the more southern portion of it, has been so long appropriated to agricultural purposes, that it is not very often the farmer is now called upon to remove the incumbrance of vast masses of dark impenetrable forests. Yet the temporary scarcities of grain we have lately felt, in consequence of the war, has rendered it a matter of absolute necessity that some portion of the enormous extent of waste land that disgraces our agricultural industry, should be put into a train of cultivation; and hence the inclosure of barren commons, and the reclaiming of bogs and marshes, have, for the last six or seven years, become a fashionable, as they will in the end be found a very profitable, pursuit.

Our woodlands have already been cleared too effectually, and instead of giving instructions how to extend their demolition, we shall rather, as we proceed, point out the best means of promoting their encouragement and spread. In most new colonizations, however, this is an enormous incumbrance, and requires a long and patient series of herculean labour for its removal: while, to add to the difficulty, the remote and self-banished settler, is woefully deficient in the means of assistance. It is but the mere outline, therefore, of the British territory in New South Wales that has, to this hour, been brought into a state of cultivation: many of the settlers give up their work in despair; and dispose, for a mere trifle, of the land that has been granted to them, and of which they have cleared but a few acres; while even the most patient and persevering, incapable from poverty, of purchasing the labour of other hands, can only appropriate a small part of the toil of their own

families, during the more leisurely seasons of the year to an extension of their boundary.

In many parts of North America this process is conducted upon a bolder and a much better plan: for it is no uncommon thing, whether in the back settlements of Canada, or the United States, for hordes of clearers to travel from district to district, and undertake to free, at a certain price per acre, any quantity of land against a given time. It is only the more opulent or speculative of the Americans, however, who can thus undertake to clear the ground by wholesale. And hence the general aspect of the territory of the United States may be thus not unfairly represented: an almost uninterrupted forest; five great lakes on the north: on the west, extensive savannahs; in the centre, a chain of mountains, their ridges running in a direction parallel to the sea-coast, the distance of which is from fifty to an hundred and thirty miles, and sending off to the east and west, rivers of longer course, of greater width, and pouring into the sea larger bodies of water than ours in Europe; most of these rivers having cascades or falls, from twenty to a hundred and fifty feet in height, mouths spacious as gulphs, and on the southern coasts marshes extending about two hundred and fifty miles in length; on the north, snow remaining four or five months of the year: on a coast of three hundred leagues extent, ten or twelve cities, all built of brick, or of wood painted of different colours; round these cities, farm-houses, built of trunks of trees, which they call *log-houses;* in the centre of a few fields of wheat, tobacco or Indian-corn; these fields, separated by a kind of fence made with branches of trees instead of hedges, for the most part full of stumps of trees half-burnt, or stripped of their bark and standing; while both houses and fields are inchased, as it were, in masses of forests, in which they are swallowed up, and diminished both in number and extent the further you advance into the woods; till at length, from the summits of the hills, you perceive only here and there a few little brown or yellow squares on a ground of green. Add to this a fickle or variable sky, an atmosphere alternately very moist and very dry, very misty and very clear, very hot and very cold, and a temperature so changeable, that in the same day you will have spring, summer, autumn and winter, Norwegian frost and an African sun; the perpetual change depending, in a very great degree, upon the uncultivated state of the soil, the perpetual evaporation which is so largely ascending from its surface, and the sudden chills to which its partial openings are continually giving rise. Here, if any where, we have the most ample proof of the great benefits resulting from a cultivation of the soil: in proportion as the land becomes cleansed, and the plough and the furrow perform their offices, intermitting fevers vanish, the countenance re-assumes the glow of health, the animal spirits flow with increased elasticity, the country becomes populous, and the state enriched.

In our own country, however, it is rather of weeds than of wood that new ground requires to be cleared: these weeds are sometimes shrubs, or sub-shrubs, as the whin, briar, bramble, and furze; bnt more generally herbs, either annual or perennial, some propagated by seeds, and others chiefly by roots, and hence requiring a different process for their destruction.

There is no great difficulty in removing the first; but the two latter kinds are often productive of very great trouble, and that for many years successively. We shall treat shortly of both sorts.

Of destroying weeds propagated by seeds. These differ very considerably in their nature. The seeds of some will putrefy in a few years, if they lie moist in the earth, and are prevented from vegetating. But the seeds of others will lie many years in the same situation, without having their vegetative power destroyed, and will be found twenty years afterwards, in as great plenty as ever. The first sort may be destroyed by turning the land infested with them, from tillage into grass, and allowing it to remain in that situation for a few years; and both sorts by bringing the seeds to vegetate, and then tearing up the young plants. By frequently stirring and turning over the land, both these points will be accomplished. For every time the land is stirred and turned over, some seeds that before lay deep, are brought near the surface; the earth about them is rendered free and open, and the air which is necessary to vegitation, freely admitted: independently of which the plants that have appeared are hereby torn up and destroyed. Of the truth of this every farmer that practises summer-fallowing must be fully convinced. But in the performance of the operations by which the land is stirred and turned over, to promote the vegetation of the small seeds, great care should be taken to preserve the sap, or moisture as much as possible. This will be done, if, in stirring the land, the surface be made smooth and plain: for when the surface is rough and uneven, the drought has easy access; but, when smooth and plain, the winds have less influence, and the sap is better preserved.

The vegetation of seeds in land is also promoted by the application of dung and some other manures. If therefore dung be laid upon land infested with weeds, and the land carefully stirred and turned over several times, all the seeds in it, by degrees, will be brought to vegetate, and the weeds may thus be destroyed. But this practice, though proper for destroying weeds, may, in some cases, destroy some of the virtues of the dung, before it is applied to promote the vegetation of the useful plants which are to be cultivated. Hence, though it may be improper to follow this method when seed cannot be sown for a considerable time after the dung is laid on, as is the case sometimes when summer barley is sown on fallow, yet it may answer very well when seed is to be sown soon after, as is the case when wheat is sown.

Manures however can only be employed as destroyers of weeds, in so far as they tend to promote the vegetation of the seeds.

It is necessary to observe here, that the seeds of some weeds, particularly the different species of thistle, are carried to a considerable distance by the wind; and wherever any earth is thrown up in such a manner as to entangle them, as at the root of a hedge, or side of a ditch, they appear in great abundance. Many farmers allow them to grow there undisturbed; the consequence of which is, that their seeds are carried into the adjacent fields, and great damage done, which might have been prevented by cutting them down before their seeds were ripened. This is a cicumstance which ought to be more attended to. The best and most cer-

tain method of destroying thistles on grass lands, is to let them alone till they are in full bloom, and then to mow them with a scythe; for, if cut while young, they produce fresh shoots from the sides of each plant.

Of destroying weeds propagated by the root. Some of these infest land that is in tillage, and others land that is in grass. The first sort have such a tender blade, and such tender roots, that they cannot pierce a hard soil; but increase very fast, where the soil is free and open; while the second sort have the blade and roots so strong, that there is scarcely any soil so hard and stiff as to prevent them from making their way through it; though they are of such a nature as to be easily torn up when the land is free and open, and do not easily strike root again when thus eradicated.

With respect to the first sort, as they chiefly infest land in tillage, they may be destroyed by turning the land from tillage into grass, and allowing it to remain for some years in that situation. This is confirmed by experience. Land over-run with quick grass, and other root-weeds of the same kind, is frequently laid down in grass, and allowed to continue for some years without being ploughed. This land, when broke up again, if allowed to lie in grass for some years, is found to be clean, and the roots of the weeds destroyed. The number of years necessary for destroying the roots, depends upon the nature of the soil. If the soil be naturally hard and stiff, it is the sooner brought to such a situation as to prevent the roots and blades of the weeds from piercing it. But, if it be naturally soft and spongy, it takes a longer time before it is brought to that situation. For while the blade or roots of the weed can pierce the soil, their vegetation is not prevented. In some soils it is six or seven years before the roots of the quick grass are destroyed. The number of years found requisite for destroying these root-weeds, has, no doubt, been partly the cause of establishing the practice commonly followed. Three crops of corn are taken, and then the land is allowed to lie six years in grass, or lea. At the end of these, the farmer supposes that the lea is come to maturity, and fit again for being ploughed. When it is only two or three years old, it is called, in some parts of the country, *calf-lea;* and, if ploughed at that age, the roots are commonly very abundant.

But the sowing land with grass-seeds, instead of turning it out into lea, destroyes the roots of these weeds some years sooner. For a sward being hereby brought immediately upon the surface, the land becomes firm, the blades of the weeds are unable to pierce it, and the roots are deprived of air. Ryegrass-seed, or the common hay seed, is the most proper for this purpose. Clover, particularly broad clover, is improper; for the large roots of this open the soil in growing and extending themselves, and thereby prevent it from arriving at that degree of firmness necessary for destroying the weeds so soon as if no grass seeds had been sown.

In regard to the second sort, they may be destroyed by turning the land infested with them from grass into tillage; and it is not necessary to continue it long in this situation, for the weeds commonly disappear after the first ploughing. But as it may be inconvenient to turn a field infested with weeds from grass into tillage, or from tillage into grass; it is necessary to consider the methods of destroying these weeds, without altering the situation of the land. When land in tillage is infested with weeds, they may be destroyed by frequently stirring and turning it over in dry weather. For, the weeds being removed out of their places, the drought prevents them from striking root again. The stirring the land in wet weather is rather hurtful than beneficial: for though the roots of the weeds are removed from their places, yet the weeds themselves are only transplanted. If the land be wet, they soon strike afresh: the quickening-grass in particular, which having its pastures enlarged, makes quicker progress than ever. But, if the land be dry, the weeds do not so easily strike root again: or, if some of them should strike they continue for some time in a languishing condition, and, if removed out of their places while in that condition, are easily destroyed by the drought.

Where land is to be freed from seed-weeds, it cannot be made too fine, nor the surface too smooth; for the more perfectly this is done, the greater number of seeds are brought to vegetate. But, where it is to be freed from root-weeds, it cannot be turned up in too large masses nor the surface left too rough: for the larger the masses and the rougher the surface, the drought has the easier access, and the roots are the more effectually destroyed.

A third sort of weed is found to infest both the land that is in tillage, and the land that is in grass. These have not only the blade and roots very strong, so as to be able to pierce the soil, though hard, but also of such a nature as makes it difficult to tear them up; or have their roots of such a kind, that they may be divided into a great number of plants. If the land be in grass, they may be destroyed by digging them out, or by frequently cutting them: and if in tillage, by frequently stirring and turning it over in dry weather. But this work must be performed with ploughs properly made for cutting their roots.

There is a fourth kind of weeds that chiefly infests land that is wet. Frequent cutting, and even digging out by the root, have been tried to destroy them, but to no purpose. They are not to be seen on dry land, and, when on land only inclining to be wet, appear very weak. Draining therefore seems to be the only method of destroying these.

All kinds of root-weeds, and perhaps many kinds of the seeds of weeds, may be destroyed by depriving them of air, as air is necessary not only to the vegetation, but also to the life of plants. And hence when land is in tillage, the weeds may be deprived of air, either by burying them deep in the earth, or covering the surface. Trenching accomplishes the one, and a good crop of peas, potatoes, or any other plants that lie thick on the surface, effects the other.

2. *Of the constituent principles of soils.* In the article Earth, we have observed that the simple substances passing under this name, are nine in number, lime, magnesia, baryt, and strontian, which have marks of alkalescency; and alumine, glycine, zircone, silex, and yttria, which are proper earths, as being destitute of all alkaline property.

Soils are formed by different combinations of two or more of these, often in connexion with a considerable portion of iron, existing in the form of an oxyd or calx. The earths that are usually traced in the composition of soils, are the following, alumina, or argil, lime, or calcareous earth, silex, or siliceous earth, and magnesia; and so seldom are the other earths found to enter into the composition of soils, and to so small an extent when they do enter, that we shall dismiss them without further observation.

Argil, or alumine. This forms a large portion of the surface soil of most countries, and is also found in the mineral strata to a very great depth. It is no where found pure, but always more or less mixed with the different earths, and with other materials, such as mineral, vegetable, and animal matters. This earth is the most retentive of moisture of any, by which means it becomes ductile and tenacious; but loses these properties by the action of fire, and is converted into brick. It is the basis of the soil called *clay.*

Lime, or calcareous earth. This substance constitutes in many countries not merely the surface or soil, but also the under stratum to a considerable depth. Under this general title may be included chalk, marble, limestone, coral, shells, &c. The three first are frequently mixed with iron, and with different proportions of the simple earths; but are considered as calcareous when the proportion of that earth predominates. This matter is capable of absorbing and retaining moisture, though in considerably less degree than clay. When sufficiently acted upon by fire it becomes lime, and returns again to the state of chalk or calcareous matter on being exposed for some time to the atmosphere.

Silex, sandy, flinty, or gravelly earth. Extensive tracts of the surface of the earth in different countries are of this kind; and large masses of the under stratum also consist of the same substance: the former in the state of loose sand, and the latter in an indurated or solid state, denominated sand-stone or free-stone. It is the least retentive of moisture of all the different earths.

Magnesia. This earth is no where found in such quantities as to form a soil of itself; but it is contained in various proportions in different soils, and forms a component part of steatites or soap rock. It is to a certain degree retentive of moisture.

From these substances either in a simple or a more compound form, are derived the following soils, which are those most generally met with, clay, chalk, sand, gravel, loam, clayey loam, chalky loam, sandy loam, gravelly loam, ferruginous loam, boggy soil, and heathy soil.

Clay. This is of various colours, as white, grey, brownish-red, brownish-black, yellow, and blue; it feels smooth and somewhat unctuous; if moist it adheres to the fingers, and when sufficiently so, becomes tough and ductile, as has been already observed. In its dry state it adheres more or less to the tongue; when thrown into water it gradually diffuses itself through it, and separates slowly from it. With acids it does not usually effervesce, unless a strong heat be applied, or it should contain some calcareous particles, or magnesia.

The blue, the red, and the white clays, if strong, are said to be unfavourable to vegetation; but the stony and looser sorts much less so. However, none of them are valuable until their texture be loosened by a mixture of other substances, by which means other agents in vegetation are admitted to operate upon them. The proportions of argil or pure clay, sand, and ferruginous matter, which are commonly contained in this substance, are extremely various. The first is, however, generally in a very large proportion to the other two. Soils of this kind must therefore obviously be retentive of humidity, in proportion to the quantity of the argillaceous or principal ingredient.

Chalk, when not very impure, is of a white colour, moderate hardness, and dusty surface, soils the fingers, adheres slightly to the tongue, does not harden on heating, but in a strong fire burns to lime, and loses very considerably of its weight. It effervesces, and almost entirely dissolves in acids; but the solution is not disturbed by ammoniac or caustic volatile alkali. It promotes putrefaction in substances to which it is applied.

A soil of this kind, when little mixed with other substances, is always unproductive. It therefore requires a due admixture of other earths, and a proper quantity of vegetable and animal matters, in order to render it fertile and productive.

Sand. This substance is generally met with in small loose particles or grains, of considerable hardness, which do not cohere with water or become soft by it. It is most commonly of the siliceous kind, and consequently insoluble in acids.

Gravel. The principal variation of this from the above substance is in the magnitude of the particles. Stones which are of a calcareous quality, when small and rounded in shape, are frequently comprehended under this appellation.

Soils which are principally constituted of these two snbstances are barren, and consequently require considerable labour and expence to improve or render them capable of producing good crops.

Loam. By this term is understood any soil which has a moderate degree of cohesion; that is, one which has less than clay and more than loose chalk. Some writers, however, give a different definition of it. The intelligent author of the Body of Agriculture calls it a clay mixed with sand; and by Hill it is said to be an earth composed of dissimilar particles, hard, stiff, dense, harsh, and rough to the touch, not easily ductile while moist, readily diffusible in water, and composed of sand with a tough viscid clay.

Clayey loam is that kind of compound soil in which, besides being moderately cohesive, the argillaceous ingredient predominates. Its coherence is consequently greater than that of any other loam, but still less than that of pure clay. The other substance of which it is composed is a course sand, with or without a slight mixture of calcareous matter. By those who are engaged in cultivating the ground, this is commonly denominated strong, stiff, cold, or heavy loam, in proportion to the quantity of clay which it contains.

Chalky loam is a term which denotes a compound soil, composed of clay, coarse sand, and

chalk; but in which the calcareous or chalky part considerably predominates. It is found to be less cohesive than clayey loams.

Sandy loam furnishes us with an example of that sort of loam or soil in which the sandy part is most abundant. It has less coherence than either of those which have been just mentioned. Sand partly coarse and partly fine constitutes from eighty to ninety parts out of each hundred of this kind of soil.

Gravelly loam varies from the above only in this, that it contains a larger proportion of the course sand, or pebbles. This, and the two which have been just described, are generally termed, by those employed in farming, light or hungry soils, especially when their depth is not considerable.

Ferruginous loam. This denotes a soil which is generally of a dark brown, or reddish colour, and is much harder than any of those which have been destribed above. It is formed of clay and the oxyds or calces of iron more or less intimately blended together. It is capable of being distinguished not only by its colour, but also by its superior weight. It is sometimes found to effervesce with acids, at other times not; but when it does, a considerable portion of the irony part may be separated by proper chemical processes.

Some, which have been called vitriolic soils have a near relation to this. These are generally of a blue colour, but when heated become of a red cast.

Boggy soil. This is chiefly composed of the ligneous roots of decayed vegetables, mixed with earth generally of the argillaceous kind, with sand, and a coaly substance produced from decayed vegetable matter. There are two kinds of bogs, viz. the black, which contains a large proportion of clay and of roots more perfectly rotten and destroyed, with a mineral oil; and the red, in which the roots of the vegetables appear less perfectly decayed, but to constitute the principal part of the soil.

Heathy soil. This is that kind of soil in which there is a natural tendency to the production of heath. It consists chiefly of sand in very minute grains, intermixed with pulverised alumine.

None of these soils are of themselves highly productive, or at least none of them so productive as they may be rendered by being combined with certain proportions of other soils, which will hence act upon them as manures, and produce that kind of improvement which results from general combination or composition: and which we shall immediately proceed to contemplate.

3. *Of improving the soil by composition.* The substances employed for this purpose are called manures. Many of the simple earths, as being capable, by combination, of improving other earths, are manures in themselves. The materials chiefly employed for this purpose are the following; chalk, lime, clay, sand, marl, gypsum, ashes, stable-dung, muck, farm-yard dung, pounded bones, sea-weeds, sweepings of ditches, bog-earth or old ditches.

Of chalk, clays, and sand, we have spoken already, and their use as manures may easily be collected from the properties we have ascribed to them as earths.

Lime. This is a substance whose external characters and mode of production are very generally known. It differs from chalk and powdered limestone chiefly by the absence of carbonic acid gass or fixed air, which is expelled from these during their calcination. It eagerly re-absorbs this air from the atmosphere, and all other bodies with which it comes in contact, and which can furnish it; but it cannot unite with the air, unless it is previously moistened. One hundred parts of quick-lime absorb about twenty-eight of water. It is soluble in about seven hundred parts of this fluid. To regain its full portion of air from the atmosphere, it requires a considerable length of time, even a year or more, if not purposely spread out. When in a dry state it resists putrefaction; but with the assistance of moisture it resolves organic substances into a mucus very speedily. All lime is good as a manure, but that which is made from stone is said to be better than that from chalk.

Marl. Of this substance there are three sorts; calcareous, argillaceous, and siliceous or sandy. All these are mixtures of mild calx or chalk with clay, in such a manner as to fall to pieces, on being exposed to the atmosphere, more or less readily.

Calcareous marl. This is that kind which is most commonly understood by the term marl without addition. It is generally of a yellowish-white, or yellowish-grey colour; but rarely brown or lead-coloured. It is seldom found on the surface of land, but commonly a few feet under it, and on the sides of hills, or rivers that flow through calcareous countries, or under turf in bogs. It it frequently of a loose texture, sometimes moderately coherent; rarely of a stony hardness, but when in this state is called stone-marle. Sometimes of a compact, sometimes of a lamellar texture; often so thin as to be called paper-marl. It often abounds with shells, and then is called shell-marl; which is looked upon as the best sort. When in powder, it feels dry between the fingers; put in water, it quickly falls to pieces or powder, and does not form a viscid mass. It chips and moulders by exposure to the air and moisture, sooner or later, according to its hardness and the proportion of its ingredients: if heated, it does not form a brick, but lime. It effervesces with all acids. It consists of from thirty-three to eighty parts of mild calx, and from sixty-six to twenty of clay, in the hundred.

In order to find its composition, Mr. Kirwan gives the following directions: Pour a few ounces of weak but pure spirit of nitre or common salt into a Florence flask; place them in a scale, and let them be balanced; then reduce a few ounces of dry marl into powder, and let this powder be carefully and gradually thorwn into the flask, until after repeated agitation no effervesceuce is any longer perceived: let the remainder of the powdered marl be then weighed, by which the quantity projected will be known: let the balance be then restored: the difference of weight between the quantity projected and that requisite to restore the balance will discover the weight of air lost during effervescence: if the loss amounts to thirteen in the hundred of the quantity of marl projected, or from thirteen to thirty-two, the marl essayed is calcareous marl. This experiment is decisive, when we are assured by the external characters above

mentioned, that the substance employed is marl of any kind; otherwise some sorts of the sparry iron-ore may be mistaken for marl.

Argillaceous marl. This kind of marl contains from sixty-eight to eighty parts in the hundred of clay, and consequently from thirty-two to twenty of aërated calx. Its colour is grey or brown, or reddish-brown, or yellowish, or blueish-grey. It feels more unctuous than the former, and adheres to the tongue: its hardness is generally much greater. In water it falls to pieces more slowly, and often into square pieces: it also moulders more slowly by exposure to the air and mosture, if of a loose consistence: it hardens when heated, and forms an imperfect brick. It effervesces with spirit of nitre or common salt, but frequently refuses to do so with vinegar. When dried and projected into spirit of nitre in a Florence flask, with the attentions above mentioned, it is found to lose from eight to ten parts in the hundred of its weight. The undissolved part, well washed, will, when properly heated, harden into a kind of brick.

Siliceous, or *sandy marls.* These are marls the clayey part of which contains an excess of sand: for, if treated with acids in the manner above mentioned, the residuum or clayey part will be found to contain above seventy-five parts in the hundred of sand; consequently chalk and sand are the predominant ingredients in them.

With regard to the colour of this marl, it is brownish-grey, or lead-coloured; generally friable and flakey, but sometimes forms very hard lumps. It does not readily fall to pieces in water. It chips and moulders by exposure to the air and moisture, but slowly. It effervesces with acids; but the residuum after solution will not form a brick, as in the above kind.

Limestone-gravel. This is found to be a marl mixed with large lumps of limestone. The marl may be either calcareous or argillaceous; but it is most commonly of the former kind; and the sandy part is also generally calcareous.

Gypsum. This substance is a compound of calcareous earth and vitriolic acid, and forms a distinct species of the calcareous genus of fossils; of which species there are many different families. The general characters of this species are the following: It is soluble in about five hundred times its weight of water, in the temperature of sixty degrees; and is precipitated therefrom by all mild alkalis, and also by caustic fixed, but not by ammoniac or caustic volatile, alkali; does not effervesce with acids, if the gypsum be pure; but some families of this species, being contaminated with mild calx, slightly effervesce; is insoluble, or nearly so, in the nitrous acid, in the usual temperature of the atmosphere, having a specific gravity reaching from 216 to 231; and a degree of hardness such as to admit being scraped by the nail. When heated nearly to redness, it calcines; and if then it be slightly sprinkled with water, it again concretes and hardens. It promotes putrefaction in a very high degree.

It will here only be necessary to describe one of the families of this species; namely, that which has been most advantageously employed as a manure. It is called *fibrous gypsum;* and its colours are grey, yellowish or reddish, or silvery white, or light red, or brownish yellow, or striped with one or more of these dark colours. It is composed of fibres or striæ either straight or curved, parallel or converging to a common centre, sometimes thick, sometimes fine and subtile, adhering to each other, and very brittle: its hardness such as to admit being scraped with the nail: commonly semitransparent; in some, often in a very considerable degree.

Ashes. Substances of this kind have frequently been employed as manures. Sifted coal-ashes, those of peat and white turf-ashes, have been found the most useful; red turf-ashes have appeared to be not only useless, but generally hurtful. Wood-ashes have, however, been employed advantageously in many cases: they contain, as Mr. Bergman asserts, the four primitive earths, but according to Achard, chiefly calcareous earth; and according to D'Arcet, calcareous and magnesian earths. They also contain some proportion of phosphorated selenite, or calcareous earth united to the phosphoric acid; and almost all of them contain also a small and variable proportion of common salt, Glauber's salt, and terrene salts, which, when in a small quantity, all accelerate putrefaction; also small bits of charcoal are to be met with among them.

Charcoal. This is a substance very well known; and which has frequently and successfully been used as a manure. The most convenient mode of applying it seems to be in the form of dust.

Soapboiler's-waste. This has been found to form an excellent manure for some soils: it contains, as appears from the excellent analysis of Mr. Ruckert, fifty-seven parts in the hundred of mild calx, eleven of magnesia, six of argill, and twenty-one of silex.

Stable-dung. Manure of this kind is used either fresh or putrefied; the first is called long, the other short dung; it abounds in animal matter, easily runs into putrefaction, and when putrefied serves as a leaven to hasten the decay of other dead vegetable substances: its fermentation is promoted by frequent agitation and exposure to the air: it should however be covered, to prevent water from carrying off most of its important ingredients; or at least the water that imbibes them should not be permitted to be dissipated.

Farm-yard-dung. This manure consists of various vegetables, such as straw, weeds, leaves, fern, &c. impregnated with animal matter; it ferments more slowly than the former; should be piled in heaps, and stirred from time to time. Fern putrefies very slowly. The water that issues from it should be preserved with great care.

On the subject of stable and farm-yard dung, the Earl of Dundonald has many judicious observations. When animal dung and vegetable are mixed together, such as horse-dung, urine, straw and hay, a degree of heat is generated and disengaged by the absorption of oxygen or vital air, and water is decomposed. As the process of putrefaction proceeds, ammoniac or volatile alkali is formed; and, in its tendency to escape from the heap, combines with such parts of the vegetables and matters of the dung as had advanced to the oxygenated state; forming therewith a saponaceous saline matter. The formation of this saponaceous matter in the greatest possible quantity will be promoted by mixing and covering the dung with a due proportion of earth. Hence the dung of hot-beds is the most completely rotted, and most assimi-

lated to this saponaceous saline state, in which state it is more capable of promoting vegetation than dung that has not arrived to an equally advanced state of putrefaction.

This ingenious writer also suggests it as probable, that the particular advantages arising from the use of long dung or litter in some cases depend on the atmospheric air contained in the intervals of the soil made by the straw or litter suffering a degree of separation or decomposition in its imprisoned state, by which means the pure air or oxygen may combine with the straw and inflammable or vegetable matter in the soil; while the azot or phlogisticated air will contribute to the growth of the plants. This explanation of the beneficial effects arising to vegetation by a stagnated air, will also, he thinks, account for the benefit which plants of a certain construction of stem and leaf, and which very much overshadow and cover the ground, ultimately receive by preventing a free circulation of air.

In the application of long and short kinds of dung, preference should in general be given to such as has most completely undergone the putrefactive process. Dung and urine newly voided are not in a putrescent state; they are only advancing towards putridity, or in a very small degree putrid. The further putrescency of these substances is promoted by a due degree of heat and moisture, particularly when aided by certain saline matters. The most powerful of these are the neutral salts, containing the sulphuric or vitriolic acid, such as vitriolated tartar, Glauber's salt, Epsom salt, and gypsum. These neutral salts, on being mixed with putrescent substances, are changed into the state of hepars: hence the very offensive smell arising from dung and other matters containing such salts.

Table of the Constituent Principles of various Manures, as given by Mr. Kirwan.

105 lb.	Heavy Inflam. Air. Cub. Inc.	Fixed Air. Cub. Inc.	Water. lb.	Coal. lb.	Calx and Magnesia. lb.	Argill. lb.	Silex. lb.	Vol. Alk. lb.	Fixed Salts lb.
Fresh cow-dung..	—	—	—	3,75	1, 2	0,15	2, 4	—	0, 6
Fresh horse-dung	—	—	88	10,2	1, 5	0,5	3	—	0,21
Sheeps dung....	—	—	—	25,0	9,28 Calx. 1, Magn.	3	29	—	0,72
Rotten cow-dung	1360	120	81	10	3.	0, 6	5	0.65	Gyps. 0, 9 F Salts 0,24
Earth resulting from rotten horse-dung	1.64	1.	Water and oil 38,15	18,75	6, 2	1, 5	23,43		
Soapboilers waste	—	—	—	—	57 Calx. 11 Magn.	6,	21,		

It is evident therefore that manures should not be applied indiscriminately, but according to circumstances, which will be shewn as we proceed.

Pounded-bones. These also form a manure much used in the neighbourhood of great towns. They gradually deposit their oily part, which contains a large proportion of animal coal, which is extricated by putrefaction, and phosphorated calx. Hence bone-ash is also found to be serviceable.

Sea-weed. These weeds, particularly if mixed with earth, soon putrefy, and make manure of an excellent quality.

Sweepings of ditches. These abound with putrid matter from decayed vegetables, and consequently form a manure which is very useful.

Old ditches. These, from their exposing a large surface to vegetation, contain, when destroyed, a quantity of decayed vegetables, which putrefy and make a good manure; but both in this and the former case, it may be proper to distinguish of what soil they are composed, for reasons that will hereafter be mentioned.

4. *Of improving the soil by chemical and mechanical processes.* Though the soil be naturally or artificially composed of a due proportion of simple earths it may be rendered unfertile by stagnent waters; or may require (for the particular purpose to which it is intended to be appropriated) a larger portion of water than naturally belongs to it; or the salubrious seeds with which it is sufficiently stocked may be overpowered by the luxurious growth of peat, fen-mosses, or other strong aquatic plants. On the contrary, the soil may be fertile in itself, and yet it may be possible to render it still more so, by communicating an additional quantity of ammonia and oxygen. And hence the processes of ploughing and fallowing, of paring and burning, of draining and irrigation. Hence also the necessity of particular implements and powers for carrying such processes into execution. These must be treated of distinctly.

Of ploughing and fallowing. There is a considerable connection between these processes; for much of the advantage of both depends upon this common principle, that the more the soil is comminuted, deprived of active service, and exposed by as broad a surface as possible to the action of the air, so as to be enabled to imbibe oxygen, and perhaps light, freely, the richer and more fertile it is rendered, and the larger the crops it will produce on subsequent sowings.

Ploughing,

However, independently of these common advantages, by burying a very considerable quantity of weeds, not only destroys a great number of those that are alive, but converts the whole, whether living or dead, into useful ma-

nure. It likewise prepares the soil, in the first instance, for the grain that is to be entrusted to it, by so far comminuting it, that the harrow can easily reduce it to a bed sufficiently pulverulent for the seeds to sink into.

It is also useful for removing wetness. Every furrow becomes a kind of drain: the rain that falls upon the ridge makes its way to the furrows, and by means of them is conveyed away from the field. It is also proper for enlarging the surface, as thereby not only a greater quantity of soil is exposed to the influence of the air, but also a great quantity of it actually employed in vegetation. There is no more soil indeed added to the field by enlarging the surface; but some of the soil that lies buried, while a field is in its natural state, is exposed to the air and brought within reach of the roots of plants, when it is laid up in ridges. Some of the plants which we cultivate in our fields, have what are called horizontal roots, that is, roots that creep along the surface, and go down but a short way. Now, it is obviously an advantage to these plants, to have a quantity of the soil below, to which their roots cannot extend, brought within their reach, which is done by enlarging the surface.

Even the tap-rooted plants, that is, such as push one principal root perpendicularly downwards, have horizontal roots, by which they are nourished; it must therefore be an advantage to them to have the surface extended. Having thus shown, that ridges are advantageous, as they remove wetness, and enlarge the surface, it is necessary now to consider what kind of ridges are most proper for answering the different ends. For removing wetness, the ridges ought to be narrow; as, the greater the number of ridges, the greater are the number of drains. When the soil is wet, the ridges ought also to be steep. For the steeper the ridges are, the water more easily finds its way to the furrows or hollows. And when the soil is very dry, it is submitted, if narrow ridges are not proper likewise. For by altering the ridges, and turning the furrows into the crowns, and the crowns into the furrows, a quantity of fresh soil is always employed in vegetation. When the crown of a ridge is turned into a furrow, it is obvious that some fresh soil must be turned up, which was not employed in vegetation in its former situation; and consequently the greater number there are of ridges, the greater the quantity of fresh soil employed. In cases in which the soil is just so wet as to occasion loss in the furrows, then the ridges should be somewhat broader. For, in such cases, the fewer the furrows are, the less is the loss.

It must also be observed, that a difference should be made betwixt the situation of land in the winter, and its situation in the summer. It may be convenient sometimes, when winter grain is to be sown, or when the land is to get winter fallowing, to make the ridges very narrow; and when summer grain is to be sown, to make them broader. And as it is an advantage to have the surface enlarged, the ridges ought to be made high in the middle or crown; for the higher that the ridge is made, the more is the surface enlarged and increased. But where the soil is shallow, the ridges, if broad, cannot be raised without depriving the furrows of soil; and therefore, to enlarge the surface on such land, the ridges must be made narrow; for this both enlarges the surface, and prevents the furrows from going below the soil. Where the soil is deep, the ridges may be made broader: for though they may be raised in the crown, still there will be soil left in the furrows. The ridges must not however be made too broad: for it is evident that narrow ridges give more surface than broad ridges of the same degree of steepness, and do not cover the lower parts of the ridges so much from the influence of the sun and winds. But though, in general, it be recommended to raise the ridges in the crown, to enlarge the surface, and to allow the water more easily to find its way to the furrows; yet, in some low flat-lying land, it is proper to make the ridges as flat as possible, in order to raise the furrows. For the higher the furrows are raised, there is, in some cases, the greater command of the water, and it is the more easy to find a fall for conveying it from the land. And flat ridges have this advantage over steep ridges; they can be sown, especially in the broad-cast method, with greater exactness. It is obvious from the method of sowing, that, in sowing steep ridges, it is not possible to prevent a great proportion of the seed from falling into the furrows. This proportion is also greatly increased by harrowing. Whereas, in sowing flat ridges, the seed is equally scattered, and the harrows do not remove it from its situation. It is therefore evident from these observations, that soils in different situations require to be laid out in different kinds of ridges. It is absurd to assert, that, in every case, one kind of ridges is preferable to another; that narrow ridges are better than broad ridges, and flat ridges better than steep ridges. In some situations, one kind of ridges is most proper; and, in other situations, another kind is most proper. Every farmer ought, therefore, to consider the nature of the soil he has to deal with, the advantages and disadvantages of each kind of ridges, and then determine which are most proper to be adopted.

If there be nothing in the nature of the soil to determine what kind of ridges are most proper, then narrow ridges are to be preferred; for this reason, that a quantity of land in narrow ridges is sooner ploughed than when in broad. It is obvious, that the two first furrows which the plough takes off from the ridge, are wider than any taken off afterwards, especially if the plough begins in the furrow, as is frequently the case; so that the greater number there are of ridges, the field is the sooner ploughed. Besides, when ridges are broad, it is obvious that the plough has more work, and must take longer time in turning, than when they are narrow. But then it is supposed that the ridges are straight and equal. If they are not, the greater number there are of them, the greater is the trouble, and the more time is spent in ploughing. This, however, is of no very great importance, since it seldom happens that the kind of soil does not determine the kind of ridges to be made.

In the making of ridges some other particulars must be attended to. All ridges ought to be made straight, crooked ridges being attended with several inconveniences. In ploughing them, the cattle are not always going exactly in the same direction with the plough; short turnings are often necessary, as fields are generally bounded by straight lines, or lines not crooked in the same manner with the ridges; and when there is a small descent, the water in the furrows does not so easily run off. There are also

many other inconveniences attending crooked ridges, both in ploughing and other operations. But straight ridges not only remove the inconveniences with which crooked ridges are attended, but are attended with no inconveniences themselves: they require indeed a little attention in the ploughman, which is itself an advantage; and therefore upon all occasions are to be preferred. In all kinds of soil, ridges ought not only to be straight, but likewise equal to one another, and the same in all parts. Unequal ridges are attended with inconveniences, as well as crooked ridges. It is difficult to sow them with exactness; it is difficult to alter them when necessary; and the plough must often turn in the middle of the ridge, which does great harm, or be driven to the end without being of any use.

In different parts of this country the ridges are still crooked and unequal; and, in many places, they are much broader, and much higher raised in the crown, than the nature of the soil allows. Were the ridges altered, and the fields laid down in a proper manner, as the soil requires, it would be highly useful. At the same time, it must be observed, that much harm is done, by proceeding in this matter with precipitation. If the soil be very dry, ridges may however be altered without great danger, though high; and they may be made straight without being levelled. For, though the old furrows are still lower than the rest of the field, yet this is attended with no bad consequences in dry land; and by degrees, they are filled up in ploughing. But if the soil be wet, the ridges cannot be made straight till the ground is level, without great danger. For the water will lodge in the hollows of the old furrows, whence it will not be possible to force it. Some farmers indeed make their ridges straight before they are sufficiently levelled, draw water-furrows along the hollows of the old furrows, to carry off the water that is apt to lodge there. This is of some use, but does not fully answer the purpose. A quantity of loose earth, in ploughing, is thrown into the old furrows. The water, as it falls, penetrates this loose earth, and is retained by it, notwithstanding the water-furrows. Besides, these water-furrows must be neatly cleaned out with a spade, and made deeper in the places where they are intercepted by the crowns of the new ridges, otherwise they are of very little utility. Before ridges can be properly made straight, it is necessary therefore that the land be made level; but it is as dangerous to level ridges rashly, as to alter them before they are levelled: for if ridges are levelled too fast, and thereby a great depth of loose earth thrown suddenly into the furrows, it will not be possible to convey away the water that falls upon them. The farmer should therefore consider the nature of the soil he has to deal with, before he proceeds to the altering old ridges; and if it be wet, to level the ridges very gradually.

In levelling ridges a great hollow is made in the crowns. This is occasioned by frequent successive cleavings, which is the method commonly used. It is obvious, that, by the first cleaving, a hollow is made in the crown of the ridge equal to the depth and breadth of the furrow which the plough makes; whereas the parts on each side of the ridge are but little levelled, and at each successive cleaving this hollow is made greater. Such a quantity of new earth immediately turned up, is not fit for vegetation. Besides, this hollow becomes so great, and the parts of the ridges on each side of it so steep, that it is impossible to plough them in a proper manner. In cases of this kind, when levelling is still thought proper, some furrows from each side must be thrown back by the plough into this hollow, by which a new small ridge is formed upon the crown of the old one, and then the remaining parts of the ridge may be levelled as before. Some persons, instead of this, plough across the ridges. This method serves the same purposes; it both throws some earth into the hollows, and levels the ridges; for the plough in going carries off some earth from every height, and leaves some in every hollow. But then land must not be left in this situation during the wet season, unless the water-furrows are drawn along the furrows, and also in some cases along the crowns; for unless this is done, the water that falls upon the field cannot be conveyed away. At the next ploughing, the whole old ridges may be levelled in the same manner as at the first ploughing; or, if thought more proper, may be divided into two equal ridges, ploughed in such a manner that the furrows betwixt them may be exactly in the crown of the old ridge, and the other furrows exactly in the furrows of the old ridge. By this means the old ridge is raised from the furrows, and levelled from the crown. This method of dividing the ridges into two, will be found very proper, either when winter-grain is to be sown, or when the barley-land has a winter-ploughing.

With regard to the placing of ridges when the land is wet, they ought to be with a view to the conveying away the water: but when dry, they should be placed with a view to the retaining the water. The common way of placing ridges where there is a slope, is along the declivity in a straight line from the top to the bottom; and land is commonly laid out with a view to this. Where the declivity is gentle, this is, no doubt, a very proper way of placing the ridges; but if the declivity be great, this way of placing the ridges allows the soil to be washed away by the rain. Therefore, in this case, placing ridges across the declivity is most proper, for when ridges are placed across, the water meets with many interruptions in its course, and does not run off with such violence as when placed along from top to bottom. But instead of this some farmers make the ridges very narrow. This serves the same purpose; for in proportion to the number of furrows, there is the less water in each furrow, and consequently it runs with less violence. But, placing the ridges in this manner is not so proper for this purpose as placing them across the declivity, nor so proper for retaining the water in a dry season.

If land be very dry, and in no danger of being damaged by the stagnation of water, the ridges ought to be placed across the declivity, as near the level as possible; for this retains both the water and the soil. It is obvious, that when ridges are placed in this manner, the water cannot get off by running along the surface, by which the soil is in great danger of being carried away. And when land is dry at the head of the ridges, and wet at the foot, and no proper fall for carrying off the water, as is frequently the case, the ridges should be placed in the same manner. For, in this case, every furrow in some measure retains the water that falls upon

the ridge above, and thereby prevents it from sinking towards the bottom of the field, and lodging there.

This is likewise a very proper way of placing the ridges, even when the declivity is but small, if the land is in the situation mentioned, dry at the head, and wet at the foot. It must be owned, however, that this will not entirely answer the end proposed: for the water will penetrate the soil, and, when it is resisted by till or clay, will find its way along these to the bottom of the field. But this will not be so sudden as in the other way of placing the ridges: and the soil at the head, which is naturally dry, will receive more benefit from the rain as it falls.

In cases where land is wet, and the water can be conveyed away from the bottom of the field, the ridges should be placed across likewise; not directly, but with a small slope to a drain or furrow on the side of the field from top to bottom, by which the whole water is conveyed away. And where land is wet from the breaking out of small springs, this way of placing the ridges is also very proper; the furrows conveying away the water as it rises. Ridges placed in this manner for these purposes should not be altered.

However, where proper attention is first paid to the different means of draining, &c. many of the above directions will be unnecessary.

Different opinions have been maintained by farmers in respect to the direction, or way of placing ridges, in order to expose the land best to the influence of the sun and air: but this matter being not yet well determined, it is needless to pay any attention to the point; for where the placing of ridges makes no difference as to the wetness of land, we are chiefly to have in view the conveniency of ploughing and laying out the land in proper divisions.

There are three different methods of forming ridges by the plough: viz. gathering, casting, and cleaving. The first keeps the crown and furrows of the ridge in the same place in which they were before. The plough begins in the crown, and ploughs out the ridge, turning the earth towards the crown, where it entered. Every ridge is ploughed by itself; or, instead of this, the halves of two contiguous ridges may be ploughed together. By this method the ridge is higher raised than before. The second method keeps the crowns and furrows also in the same place in which they were before. The ridges are ploughed in pairs. The plough may enter in the furrow betwixt the ridges, and plough out the ridges, turning the earth towards the furrow, where it entered. Or, it may enter in the furrow on the right side of the two ridges, then turn so the one on the left, and plough out the ridges, turning the earth to these furrows, and from the furrow that is betwixt them. By this method the ridges are kept the same height in the crown, and one of the furrows made a little higher, and the other a little lower than before. The third is the reverse of gathering. The plough enters in the furrow on the right side of the ridge, turns to the furrow on the left side, and ploughs out the ridge, turning the earth from the crown towards the furrows. Every ridge is ploughed by itself; or, instead of this, the halves of two contiguous ridges may be ploughed together. If the ridge has been raised in the crown, by this method it is made flatter.

A field being laid out in the manner judged most proper, in respect to the breadth and height of the ridges, should be ploughed in one or other of these ways, according to its situation. If the ridges are broad and high, casting will be found to be the most proper method; for this is the only way by which they can be ploughed, and kept in the same situation: cleaving will make them flatter; and gathering will raise them higher. If they are flat and narrow, cleaving will be found to be the best method. Cleaving flat ridges, and thereby turning the crowns into furrows, and the furrows into crowns, has these peculiar advantages: a field is much sooner ploughed in this way, than in any other, and a quantity of fresh earth at every ploughing is exposed to the air and employed in vegetation, and the ridges being kept level, are sown with exactness.

Fallowing

Is also an important operation in the practice of farming, though the reason of its advantage has been strangely misunderstood by cultivators in general, and even by men of science and deep reflexion.

Mr. Kirwan ascribes its beneficial influence to the manure hereby produced by the decay of the vegetable roots which are buried under the plough, and to the carbot and fixed air which it requires from a free exposure to the atmosphere. Lord Dundonald ascribes one of the chief benefits of fallowing to the putrefaction of the vegetable substances contained in the fallowed soil, but seems to think that this benefit is rather diminished than promoted by exposure to the external air. The solution or putrefaction of vegetable substances being in his opinion, more speedily promoted by a close or stagnated state of the air, than by a constant supply and addition of oxygen or pure air, as happens to these substances when subjected to the process of fallowing. The noble lord, therefore, contends that clover, sainfoin, cabbages, turnips, leguminous crops, hemp, and those plants which overshadow the ground, and cause a stagnation of air, thereby preventing the excessive exhalation of moisture, and promoting the putrefaction or decomposition of vegetable matters contained in the soil, will prove more economical and advantageous to subsequent crops than the present practice of fallowing. By this last process, says he, not only one year's rent and labour are lost, but the vegetable matter contained in the soil is thereby rendered less fit to promote the growth of subsequent crops. Consequently fallowing, he thinks, should be practised sparingly; its principal use consisting in altering the mechanical arrangement of the soil, either by pulverizing it, or making it more compact, both of which effects, according to circumstances, being thereby produced, and in destroying root, seed weeds, or insects. These objects being therefore obtained, recourse, in his opinion, should never be had to the same operation, unless it becomes necessary from the failure of crops, or other incidental causes, which, he says, are best provided against by substituting the culture of drill crops instead of a fallow.

The same author suggests it as probable, that soils which contain much inert vegetable matter, may derive advantages from umbrageous green crops with the process of fallowing, equal to those experienced when hemp is made to precede a crop of wheat; without which prepara-

tion this crop would not have been equal to the expectations of the farmer.

Chemical experiments, however, of great accuracy and of a very late date, have sufficiently proved that it is to oxygen, which is the active principle of the atmosphere, that plants are chiefly indebted for germination and rapid growth. Ammonia unguestionably favours germination, but oxygen in a far greater degree. Mr. Achard, has sufficiently proved that vegetables grow faster in compressed than in common air, in consequence of its possessing a greater quantity of oxygen, and hence old and torpid seeds that refuse to germinate in any other way will often germinate in a few hours when steeped for a short time before-hand in exymuriatic acid.

Paring and Burning.

This series of operations are useful in all soils, and after crops of every kind. It has been supposed by many to be as injurious in grass lands by destroying the seeds and roots of the future grass as it is serviceable by its destroying weeds and producing carbon. This, however, is a gross mistake It is true that a slow smouldering fire answers better than a brisk flame; but this is rather that the carbon is hereby rendered more perfect than that the roots or seeds of the grass have been essentially injured: the roots lie too deep for any serious mischief, and the seeds are capable of enduring very strong heat without destruction.

We are told by lord Dundonald, that moors overgrown with ling of heath, peaty soils, or such as are covered with a sward of course unprofitable herbage, and contain a superabundance of vegetable matter, may, be subjected to this process with very beneficial effects. It may also, he supposes, be attended with advantage to strong clayey soils, from the effect that burned or half-burned clay has in rendering such soils more open and less tenacious. In which case the benefit arising from the mechanical arrangement of the soil will probably more than compensate for any supposed dissipation of the vegetable matter of the sward. It is however suggested, that it would be more economical, when the soil is thus intended to be made more open, to calcine the clay in clamps or kilns, and afterwards spread it on the ground, either in its simple state or mixed with lime. Paring and burning are the processes which in the cultivation of peat mosses and fens, have been usually made to succeed the operation of draining. In this case, care, the author observes, should be taken to burn only as much of the peat as will yield the proportion of ashes necessary to alter the arrangement of the parts of the soil: an effect, he thinks, which with still more advantageous consequences may be attained by lime, limestone-gravel, or even by common mould.

The ashes of fresh or growing vegetables alone produce saline substances or alkaline salts; none can be procured from peat or decayed vegetable matter. The proportion of alkaline or other salts produced by paring and burning is so very small, that if the benefits immediately arising from these processes were to be ascribed solely to them, it might, he says, perhaps be more economical to purchase them at the market price.

The saline matter produced in these processes generally consists of vitriolated tartar, the alkali of the burnt vegetable combining with the sulphuric or vitriolic acid, which, in different states of combination, is contained in most soils. Vitriolated tartar has very powerful effects in promoting vegetation; but as it is not to be procured in sufficient quantity for the purposes of agriculture, the deficiency may be supplied by Epsom and Glauber salts, the effects of which he asserts to be equally beneficial when applied to the ground.

The method of paring most in use is with downshare or breast-ploughs, taking off a turf as thick as the nature of the soil will admit, from half an inch to two inches; the thicker the better, provided there be a sufficient portion of vegetable matter contained within it, to make it burn well; the expence for paring it in a moderate thickness, where the land is not very flinty, is 20s. per acre; for laying it up in heaps and burning, 10s.; and for spreading the ashes, 3s. A coat of manure is thus produced on the land, of from eighty to one hundred and sixty cart-loads per acre, for the trifling expence of 33s. A hundred cart-loads of dung, purchased from neighbouring towns and villages, at the distance of three miles from the land, would cost, carriage home included, ten times the price of downsharing, and yet would not improve the land more. But, where the land is well covered with turf, it may be ploughed for burning, about two inches deep, with a common plough, drawn by a pair of horses, early in the spring; and as soon as a drying wind sets in, the turf may be laid in heaps, and burnt by labourers for 1l. 1s. per acre; which will produce near two hundred cart-loads.

The ingenious Doctor Anderson also remarks, that it is an undoubted fact, confirmed by the experience of many practical farmers, that on many poor soils a crop may be thus obtained much more abundant than could be obtained without it. This fact, and it is an important one, is admitted even by those who oppose the practice. It is well known by every practical farmer, that an abundant crop of any kind, under judicious management, is one of the most certain means of laying the foundation for future crops; and in cultivating waste grounds, it is a great point gained to obtain a good crop at the commencement of the operations.

Of Draining and Irrigation: Bogs, Peat-fields, and Water-meadows.

Land may be overcharged with water from various causes: the subsoil may be so stiff and loamy as not to absorb the wet that settles upon it: it may be exposed to a perpetual flow from higher grounds; or it may be drowned by springs bursting up through the subsoil. In all these cases, draining is highy necessary; and the particular mode of draining must depend upon the cause that produces the surcharge.

In the case of a stiff and cohesive subsoil that prevents the water from filtering through, the common mode of draining is by furrows and ridges, communicating with each other from the upper to the lower part of the field, not running in straight lines but with a diagonal direction, in order to prevent the soil from being washed down along with the surplus water. It was formerly the fashion to make use of grips or furrowed lines filled with bavins or furze; but these soon become so completely clogged up by the descending soil, as to render it easier

for the water to run off in almost any other direction than in channels so completely blocked up and impacted.

When the water descends from higher grounds, or from springs, bubbling in some more elevated part of the field, ditches are often found convenient to receive the entire flow, being dug as high up in the field as will answer the purpose.

But the plan which has been most fashionable of late for almost every kind of aqueous surplus is that of boring through the subsoil at convenient distances into the first spongy stratum that is beneath it. This however, requires an under stratum not always to be met with, and though apparently practised with great success by Mr. Elkington, the projector of the practice, has very frequently failed in the hands of other land engineers; and perhaps the *miner*, as it is called by Dr. Anderson, (a mere plough-share fixed in a strong beam without mould-boards, and drawn by four or more horses in the furrow the plough has just made, sinking twelve inches deeper than the plough, and without turning up the substratum) may be found more generally serviceable in the hands of those who know but little, or nothing of mineralogy.

The reclaiming of bogs, and peat-fields, is in the first instance, to be attempted by the same means, though this forms but a small part of the entire process that bids fairest to prove successful in this case. The best writer, as well as the most able and successful practitioner in this branch of agricultural engineering is Mr. W. Smith, who has lately published a valuable pamphlet upon the subject from which we shall make a few extracts.

The very abundant and the very early crops of grass that enrich the water-meadows of Wiltshire, in which the water is perpetually trickling over the surface for many months in the year, induced this writer to conceive that pure running water so far from being injurious to the germination of grass seeds, or the extention of their roots, adds largely to the increase of both whatever be the quantity communicated to them; and that it is only when water is stagnant that it proves injurious. He has hence warmly recommended, and extended the practice of irrigating grass lands in all situations in which it is capable of being made use of. And in the reclaiming of peat-lands he has not satisfied himself with the mere process of under-draining, or even of paring and burning; but having drawn off the stagnant water by under-drains, he immediately irrigates the surface by a perpetual trickling of other water from a higher spot, taking advantage of the slope of the field, where such exists, or else producing a gradual fall by artificial means. By this plan he has sufficiently proved that the grass seeds contained in the soil itself, which would not germinate under the stagnant water while the fern-mop, and other aquatic plants constituting peat grew in it with great luxuriance, now, in their turn begin to sport forth in the most healthy and abundant manner, and as much triumph in running water over the peat-plants, as the peat-plants, in cold stagnant water, triumphed over the grass seeds. The most valuable experiments of Mr. W. Smith, have been exhibited in the Lexham bog, now the Lexham water-meads belonging to Mr. Coke of Norfolk, and in Prisley bog belonging to the duke of Bedford; both which have been most astonishingly converted from black, barren, musky and stagnant wastes to rich luxurious water-meadows, crowned with an earlier and more abundant crop than any of the meadows in their respective neighbourhoods.

"A water meadow, observes Mr. Smith, should be contrived to have a complete command of the water at all times, so that any part of it, or the whole may be made wet or dry at pleasure: this cannot be done if it be not well formed at first. There is often more time spent in the management and alteration of an ill-shaped meadow, than would make a new one.

"In a good water meadow we have stated it to be necessary, that the whole should be so contrived as to have a complete command of the water at all times, and upon every part of it, otherwise much water may be wasted by an unequal distribution, and the crop will be of unequal growth; the grass will be injured in some places by a want of water, and in others from its redundancy. If it be observed that an irregular meadow experiences the good effects of water partially, it affords reason to believe, that if the supply be sufficient a proper direction and management would render the whole equally productive, and the other expences would always be less.

"No part of a meadow, either in catch-work or beds, should be so formed as to be floated directly from the main feeder; but all the main feeders should be kept high enough to discharge the water into the small feeders with considerable velocity and through a narrow opening. The motion of water is truly mechanical; it requires a great deal of ingenuity and a perfect knowledge of lines and levels to make it move over the ground in a proper manner. No two pieces of land being exactly alike renders it still more difficult to set out a water meadow; but even if the figure of two pieces be alike, the inequalities of surface will probably vary. Each meadow therefore requires a different design, unless the land-owner makes up his mind to the heavy expence of paring off banks and filling up such hollows as may be necessary to reduce it to some regular method. The construction to be varied according to the nature of the ground. This constitutes the difference between the water meadows of Berkshire and Devonshire. Those of the latter are upon small streams, carried round the sides of the hills, and are chiefly catch-work; those of the former, being near large rivers and boggy ground, are thrown up into ridges to create a brisk motion in the water; and also for the most essential purpose of draining off all superfluous moisture which might be injurious to the grasses when shut up for feeding or mowing. Where there is much floating to be done with a little water, or rather where the great fall of a small stream will admit of its being carried over a vast quantity of ground and used several times, it is desirable to employ it in such a way, though meadows so irrigated must not be exhibited as perfect models. If it should answer the purpose of a coat of manure upon such an extent of ground, it is all that can be expected, and will amply repay the expence. Losing fall is wasting water. All the drains of a water-meadow require no greater declivity than is necessary to carry the water from the surface, therefore the water ought to be collected and used again at every three feet of

the fall, if it be not catch-work. It is sometimes difficult to do this in bed-work meads, but where the upper part of the meadow is catch-work or in level beds, and the lower part not too much elevated, it may be done. By collecting and using the water again in the same piece of ground before it falls into the brook, a set of hatches is saved, and it is not necessary to be very particular about getting the upper part into high ridges, since that part of a meadow which is near the hatches generally becomes the best, and the lower end of the field being often the wettest or most boggy in its original state, requires to be thrown up the highest. If the land is of a dry, absorbent nature before floating, it is not necessary that it should be thrown up into high beds. There are many good meadows in Wiltshire that have little work in them, and some that have neither drain or feeder: but these are extraordinary situations which do not occur in any other county, or they must have suggested the ideas before stated to have been the origin of floating. I have some reason to think, from the natural warmth of peat ground, which keeps it from freezing, that such land will produce an earlier crop of spring seed than any other. At all events it will first shew the advantages of irrigation, and gravel or sand may be reckoned next to this. The effect of water upon clayey soils does not appear so promising at first, but it seems by what has been done in the lower end of Mr. Rickwood's meadow, near Longleat, that this sort of land may by good management be made equally fertile with the others. The Rev. Mr. Wright says (in his treatise on irrigation), that some of the best meadows in Gloucestershire are upon a clayey sub-stratum. All boggy land is full of aquatic grasses, which may be the reason why it produces such a remarkable crop on the immediate application of the water. If grass land could be ploughed to set two sods leaning against each other, with the grass outward, the roots of the grass would be perfectly dry all winter; the shoots would have the full benefit of the sun, and a great advantage from mutual shelter. This (upon wet land) should be ploughed the way the water runs. If ground ploughed into this form before winter, could be watered toward the spring so as to give it a good soaking, it might be pressed down again to a level surface with a heavy roller. If these narrow ridges were crossed with level trenches at every forty, fifty, or one hundred yards distance, according to the fall of the ground, and those trenches made to communicate with other main trenches, which should run up and down the slope, and supply or discharge the contents of those which are horizontal—such ground might be laid dry or wet at pleasure. And I am inclined to believe, that land so shaped might be floated all winter with stagnant water to its great benefit, and perhaps in the spring also, if the water be changed at frequent and proper periods; for the water would remain only in the furrows, where there would be little or no vegetation, and the newly loosened soil of the ridges could not fail to absorb moisture, such as will promote the growth of the grass without any danger of putrefaction. The levels must be taken before a piece of ground be ploughed into this shape, and the earth taken out in cutting the cross drains must be used in stopping the furrows on the lowest side of them. Perhaps upon wet grounds it would be necessary to re-plough it every autumn, or the strong lands might become too solid to receive the same benefit by it; and it will be necessary to level the ridges every spring, if the ground is moved, but if summer-fed, it might as well remain in this form as any other. This easy method of getting land up into ridges, which are very narrow, gives to the surface all that inclination which is necessary for drawing off water, and is certainly so far likely to answer the purpose of irrigation. The water is thus under the same command as in any of the best formed meadows, and a much less quantity will be sufficient than under any other system of irrigation. It might perhaps answer the purpose to float young wheat, or any other sort of grain by a similar method. I am inclined to think that flat peaty ground, such as the level fens in Norfolk, which are subject to be covered a few inches deep every winter with stagnant water, would be much benefited by ploughing in this way before the floods commence. Some part of it would thereby be raised above the water and vegetate quicker in the spring, and the sedgy matter growing up in the furrows, would in a few years raise them to the same level. The cross drains, where on a declivity, would serve to catch and re-distribute the water, and the fall from one to the other must be very little. If this method will not do for irrigation, I expect that four-furrow ridges of turf, with a small feeder upon each, would answer all the purposes of a more expensive system. There is always good grass by the side of the feeder, whether the water runs over it or not; and a meadow of this sort would be nothing but feeders. It requires so little elevation of ridge and fall in the feeders, that the water might be soon used again, therefore a very small quantity would suffice; and if there was a scarcity in the winter the whole discharge might be stopped, and gradually lowered in the spring. This method would answer all the purposes of complete saturation, which seems to be one of the most essential parts of irrigation, and might be applied more or less, according to the time of the year. When the water is put on, I apprehend no grasses would sustain any injury by exclusion from air for a day or two at the first application. If these ridges could be elevated but four or six inches above the furrows, it would give the surface nearly the same slope as the wider ridges of common meadows; perhaps it would be better to begin ploughing the furrows wide at the ridge and very narrow at the furrow, which would leave but narrow spaces for drains. If a piece of turf ground were ploughed in such ridges, according to the common way of turning over the furrow, if it were set pretty much on edge, I am induced to believe that the grass between would soon cover the whole surface.

"Perhaps ridges might be made by beginning the two first furrows more apart than the usual width, thus leaving the width of one furrow between the two first to constitute the channel of the feeder. These ridges must be ploughed up and down with only three or four inches fall between the cross feeders, and the water may be brought into use again at every other set of beds. If the ground requires to be loosened every year, or once in two or three years, it will not be attended with much expence, and there will be no very great inconvenience in mowing ground in this shape, if the sides of the ridges be about a swath wide. I should think that

meadows of this sort might be made for 25s. or 30s. per acre, floated with less water than catch-work, and have many advantages over it; viz. the water would lie more above the surface, would be more at command, and therefore changed more easily, and it may be pent up better to get a good soaking when scarce. This may be done more effectually in turns, and will run dryer when the water should be taken off. It does not require much skill in the making or management. All the water will be let through nicks, instead of running over a nice level edge, which in the first place is seldom made well, and in the next is difficult to keep in repair. This sort of work would have all the advantages of drains and feeders, whereas the same channels are obliged to serve for both in the common catch-work; it would require but very few or no stops, and consequently wants but little attendance. It might be practised where there is six or eight inches of fall between the cross-feeder and cross-catch, as the water of each ridge, which should be short, may be let out by a sod with less trouble in the regulation than catch-work. Much of the expenses of a water meadow must depend on the number of hatches, and the cheapest and best method of executing them; I have many times turned my thoughts to the improvement of this part of the business. Masonry is always very troublesome and expensive, and more especially in meadows, where the materials must be brought from a great distance, and is often to be laid upon a bad foundation under water: wood work is also subject o much leakage and liable to decay, where it is alternately wet and dry. A good penstock sluice or dam, to stop up a stream of water, for the purpose of floating the land, should be so constructed that no water shall escape, with a proper place to discharge the surplus. If this be done by letting it fall over the top, it becomes necessary to sheet the bottom of the hatches with timber or stone, and even a small stream which has to fall a considerable height, will soon undermine the foundation of the hatches, unless much pains be taken to secure them. I should therefore prefer damning the stream with a pipe laid underneath, to be plugged up with another pipe, which should reach to the top of the water, and serve as a wear to discharge the surplus through the same pipe, which will carry away the whole when this hollow plug is drawn. The top of the hollow plug should be hooped, and the bottom fastened by three or four chains of equal length, which will admit of its being drawn and replaced without difficulty, and prevent its being taken away.

"If the trunk through the bank or dam be laid sloping, it will carry all the water of a small stream, save a great expense in the hatches, and make the stoppage of the water much more complete and manageable. If a meadow can be floated from the water which comes from an under-ground drain, and it be at all desirable to return that water back into the drain again, it will be best to cut open the drain, and lay a pipe into it four feet long, with another pipe affixed to the upper side of it, long enough to reach to the surface of the ground intended to be floated. A tube of this sort may be easily fixed in the drain, and well stopped round, so that no water shall escape, with an opening on the upper side for the water to rise in the tube which the plug goes through. The plug must be cut off level with the top of the tube, and the whole may be covered with a flat stone.

"It is evident that a tube of this sort will cause the water to rise to the surface when the plug is in, or let the water pass along the drain in its usual course when it is out.

"Where the main feeders of a water mead are not more than three or three feet and a half wide, and are subject to no great inundations or hasty floods, which descend with considerable force, it may not be necessary to make any contraction in the stream, in order to regulate the height of the water, nor to have any expensive rollers or racks attached to the hatches. While the head of water can never exceed three feet, nor the width of the feeders, there can be no difficulty of drawing them if made in the following manner: If the width of the main feeder be not contracted, the water which will rush through on drawing the hatch will have less power to fret away the sides and bottom of the channel, than when it falls with much more rapidity on a sill or through a narrow opening. If the sill is laid in something deeper than the bottom of the channel, I should think it better, as the sediment would then lodge on the upper side, which would tend to make it more water-tight at bottom.

"All drains or channels for carrying the water on or off the land, in that constant course and regular quantity which practice proves to be necessary, have two very different uses, and they have been called by two different names. It will be recollected that those which bring the water into the meadow and distribute it along the ridges, have been denominated feeders, and those which collect it in the furrows or bottom of the slopes, and carry it into the larger ones, which lead into the old channel, are called drains. The first sort continually bring a supply of water to make the slopes wet, and the other sort carrying the water away, prevent the meadow from getting too wet during the time of floating, serve to drain it till dry when that operation is over, and to remove any superfluous moisture which may leak from the soil or fall from the clouds. It is common in some counties to call the feeders by different names—as carriages, gutters, &c. &c. which rather confound than explain their uses; and these names being merely provincial, there can be no harm in deviating from terms of such limited sense. Drains or channels for the water, whether great or small, have but two distinct uses; I shall therefore for the sake of perspicuity, call all that bring the water on by the accustomed name of feeders, and all those that take it off by the appropriate name of drains, denominating those large ones which convey the water to the meadow, and along the main ridge to supply the other, by the name of main feeders; and the ramifications which run along each ridge and distribute the water down the sides, by the name of floating feeders. The first operation of floating begins, or ought to begin, at the edges of these feeders; the main feeders being nothing but channels or roads along which the water must pass, from the places where it can be found to the places where it is to have its effect. The place of its use lies between the floating feeder and the foot of the slope or drains, which are made in every furrow for the purpose of catching the water; I shall therefore call these by the name of catch drains, and those which

collect the contents of each of these drains, being larger and conveying more water, by the name of main drains. Thus every drain which is made use of in a water meadow may be easily explained by the name of main feeder, floating feeder, main drain and catch drain.

All floating may be done without building hatches in great rivers, which are often attended with heavy expences and many inconveniences. If the proprietor have the land far enough up the river, nothing more is necessary than to go thither and cut a channel out of it, which shall be deeper than the bottom of the stream. The water which will be taken out in this new channel, may be dammed up by hatches in it at any place most convenient for getting it out upon the surface.—To turn it into its old course down the river, nothing more is necessary than a hatch at the upper end of the feeder. Feeders constructed in this way will be extremely serviceable in time of floods, for by drawing both the hatches an entire new channel will be opened, which is generally much straighter than the old one. To contrive the shortest possible way to get the water upon the ground, it is very evident that an obtuse angle is best calculated for that purpose; it shortens the lengths of the feeders, facilitates the motion of the water, increases the velocity, and consequently preserves that natural warmth or motion which keeps it from freezing in the winter or stagnating in the summer. It also prevents the accumulation of scum, or whatever floats upon the surface, and enables the floater to distribute the water much more equally on every part of the work than if it went in a more circuitous course. The wind has less power to retard the motion of the surface, and the sediment which should go out upon the beds is less liable to lodge in the bottom of the feeders, and consequently the feeders will be cleared out at much less trouble and expence, especially if there be proper plugs or small hatches to draw up for the purpose of sending a stream of water through them, which has been done in the meadows at Prisley farm, near Woburn. It may appear to many that these hatches are too expensive or unnecessary, but practice proves that the first expence is the best, and that once well done is done for ever.—Inclined planes are absolutely necessary for the purposes of irrigation. To form these between straight and parallel lines, it is necessary to dig away land where it is too high and move it to those places where it is too low, to make such an uniformity of surface. The new made ground will of course settle in hollows proportioned to the depth of the loose matter which has been recently put together, but this settlement will not take place until the new soil has been completely soaked and dried again; therefore these effects cannot be remedied before the second or third year of watering; it will then require more skill to manage a water meadow for the three or four first years, than it can at any time afterwards.

The benefit of these experiments depends so much upon the good management and patient perseverance of those who undertake them, that I do not wonder irrigation has so often proved unsuccessful. However simple the construction of a water meadow may appear to be on a superficial view, those who enter minutely into the concern will find it much more difficult than is commonly imagined. It is no easy task to give an irregular surface that regular yet various figure which shall be fit for the overflowing of water. It is very necessary for the operator to have just ideas of levels, lines and angles; a knowledge of superficial forms will not be sufficient. Accurate notions of solid geometry (obtained from theory or practice) are absolutely necessary to put such a surface into the form proper for the reception of water, without the trouble and expence of doing much of the work twice over.

Amongst my numerous observations and experiments made in the art of irrigation, it appears that loosening the soil tends very materially to the destruction of rushes and other bad herbage of a bog, and as highly promotes that most desirable change to the best of grasses; and I have also observed, that merely moving the soil and laying the sod on again, will make a great improvement in pasture land; this has been rendered very conspicuous on many parts of the canal near Bath, which was under my superintendance for six years, but most remarkably so in a piece of clayey and stony ground, which was levelled by James Stephens, Esq. in his park at Camerton, on whose estates I first put in practice my ideas of draining, derived from a knowledge of the strata.

In those great districts of water meads, which in Wiltshire are watered by the common consent of many different proprietors and occupiers of land, the operation of floating must begin and end at certain fixed periods, which it is necessary for every one to know and regularly adhere to, not only to produce a crop of grass, but for the procreation of those animals that eat the grass; consequently as every farmer knows at what time he shall have grass for his sheep, he so manages his breeding flock, that the lambs may be strong enough at the usual time of feeding to go with the ewes, to take their food in the meadows and return to the fold for lodging.

The time to commence feeding upon those large streams is generally about the 25th of March; therefore if the winter be very mild and favourable for the growth of grass, it sometimes gets to such a height as many farmers, unaccustomed to the herbage, might think to be much too course, and luxuriant for sheep, and even too high to be fed off with cattle. So great was the luxuriance of grass in the water meads of Wiltshire two years' since, occasioned by the mild growing weather immediately after the commencement of floating, that some farmers laid their meadows dry, and fed it off in the end of November and December, and by floating again, obtained a crop of feed in the spring before the usual period. Many who did not adopt this method, lamented their grass was too high even in the month of February, and it was then not uncommon to see it in the water meads nine inches high, laid on the ground and white at the bottom, before the lambs were strong enough to go into the meadows. Some apprehended that the long sour grass would be wasted, yet it was astonishing with what avidity the sheep devoured it, and even preferred the parts which were the longest, and rendered white at the bottom from its extreme thickness; this they would gnaw down to the roots. It was remarked by Mr. Davis, that the grass then on Rickwood's mead was such a crop as, at the usual time of cutting it, would have been estimated at 18 cwt. per acre. Many declared they never saw the crop

of the water meads so very abundant and early; but on visiting the same meadow, at the particular request of my friend Mr. Davis, on the 10th of March (when it had been feeding more than three weeks), and asking the floater if they ever began to feed it sooner, he replied, "he had had the management of the meadow more than thirty years, and never knew it so early, but once, when they began feeding it on the 11th day of the first month in the year." I walked over the greatest part of this extraordinary piece of ground with some considerable difficulty, from the thickness and height of grass, and I could discover but one place (to the great credit of the floater) which was worse than another, and that not two rods square; the man soon saw me notice it, and before I could mention the circumstance, told me he knew what I was looking at, and had contrived to do away even such a trifling defect; so this may be truly called a spotless meadow.

The numberless ignorant remarks which I have heard against irrigation, on account of the quality of soil and water, induced me to be rather minute in that part of my inquiries. The water comes partly from the tail of a mill which stands at the upper end of the meadow, and partly from the pond above it, and is consequently very irregular; and these variations require much more skill and extra attendance to make it produce a regular effect. The sub-soils of the meadow, I was informed, consisted of three different sorts, gravel, sand and clay, but the effect of irrigation had so obliterated all marks in the herbage, by which they are usually distinguished, making one uniform green carpet of grass, that I could perceive no difference. On asking the floater which was the best part, I was informed the shepherd supposed the gravelly, and that he always wished to bring his flock there first. This preference I conjectured to arise rather from the absorbent nature of the sub-soil than any great variation in the herbage; for a porous hard sub-soil is almost indispensable, if floated land must be made dry for sheep at that early period, when the sun and wind have but little drying effect. Hence appears the necessity of so constructing water meads (as before observed) to render them most absorbent, or of having some naturally absorbent soil floated, to feed first at this very early season: for it is necessary to apprize those unacquainted with water meads, that no land is dryer, when the water is off, than a water meadow—at least all good meadows should be so constructed.

By the management of water meadows in Wiltshire, the water is continued trickling over the surface till the grass is grown to the height of five or six inches; and if the weather be cold, nearly to the time of feeding. This is one advantage which meadows, that are floated with clear water, have over those which are floated with water that would make the grasses foul or gritty; as the practice of floating may be continued longer with clean than foul water.

The meadows floated with clean water have also the advantage of turning it on to soak the grass a few days or a week before mowing. After the hay is taken off, the water (where it can be obtained in the summer) is put on for a few days to cool the ground, and promote the growth of the after-grass. But wherever sheep are depastured upon the after-grass, the Wiltshire farmers seldom think it advisable to use any water after mowing, or very sparingly, as too much watering in the summer may subject their sheep to the rot. But the long practice of feeding off that part of the produce of water meads, which is the effect of winter watering, is well known to be perfectly free from this deadly disorder.

It must also be considered, that the amazing crops of grass mown from a water meadow shade the ground and keep it so extremely cool, as to promote a most rapid shoot of after-grass, without the necessity of putting on the water. In most of the Wiltshire bourns many water meads are floated from streams which are perfectly dry all summer; but where water can be obtained, and cows are fed, it may be well applied to procure grass to keep up their milk at the end of the summer months. I have heard that watering and feeding alternately is practised with great success in some parts of Berkshire. The after-grass is frequently fed off with cows or horses in some parts of Wiltshire; for where water meadows can be made completely dry, as they all ought when floating ceases, heavy cattle do not injure the works to the degree that some have imagined. The spring feed, except in very few instances, is eaten off with sheep; and previous to hurdling off the crop, all water should be prevented running on the meadows, and drawn out of all the feeders and drains, to render the ground sound and dry to receive them. The time required for this must depend very much on the absorbent nature of the soil, the slope of the ridges, and state of the weather; four or five days, or a week, will be generally sufficient. Laying the ground dry before feeding also renders the grass firmer and better for the sheep, if it be not deprived of water long enough to check the growth: in that case it may become dead at the bottom, like the grass hereafter described in the account of marshes. Sheep should not be turned into water-meadow grass too early in the morning, but be kept upon the fallows or some sound dry ground near, till the dew is off. But the practice in some parts of Wiltshire of keeping them in the fold till ten or eleven o'clock, will not be thought commendable by those who take that laudable pride, which now so generally prevails, in obtaining the best breed of this most useful animal. The early grass of Wiltshire water meadows is commonly preserved for the ewes and lambs, it being seldom that a farmer in that part of the country, where water is scarce, can obtain water-meadow grass for the whole of his flock; and even the ewes and lambs are fed with it but once a day at the commencement of feeding. The quantity consumed in a day, or rather at each time of feeding, being ascertained by hurdling out a piece in the most convenient place for making a beginning; at the same time hurdling out another such piece, to which the lambs only have access, by means of a hurdle or two made with openings for them to creep through—this is better than suffering them to have the whole range of the meadow, as they might sometimes stroll too far from their dams, and render them unquiet.

Amongst the numerous prejudices against the art of irrigation, those which relate to the quality of water and time of using it, are the most considerable. Many are ready to allow that water would do good on dry land in the hottest of the summer months; and also that the drainage of a farm-yard, or town, or cream or sediment washed from rich arable lands in hasty

rains, might do good upon the meadows at any time. But few have any conception how cold and clear water, applied to the ground in the coldest months, can have any beneficial effect on vegetation. Nothing in the art of farming seems more paradoxical, yet nothing in nature can be more plain to those who attentively view her annual productions.

"It matters not with what sort of grasses a new made water meadow should be sown, the water invariably producing those which are most congenial to the state of the land and the degrees of moisture. If none whatever were sown, as was the case with the three meadows made out of the bog at Prisley farm, it is proved that the water will produce those which are most esteemed and destroy all others. But it appearing necessary that something should be sown to hide the many bare parts of the soil occasioned by making a water meadow, common hay-seeds and rye-grass have been tried at Mr. Beck's and other places. The latter answers all the purpose of a temporary covering to the grounds, and for a short time grows very well in these degrees of moisture. We have some instances in Mr. Beck's meadows, where grasses selected from those most common to water meadows have been sown on one part of a bed regularly floated, which have not been in any degree thicker or better than those on the other part where none were sown.

"If we take a general view of all the unimproved lands in this island, and consider what parts of them are most capable of being benefited at the least expence, we shall find them to be low marshes and meadows situated on the confines of rivers.—This is the land where nature has done the most, and art the least to make it good; in fact in too many situations we find the works of art have so far perverted those of nature, as to render them of very little value.

"There are clearly two distinct sorts of good marsh land; the one which is most generally considered as the richest feeding ground, has an under soil of ooze, which must have been originally overflowed by the sea, or some large rivers; but by subsequent imbanking and draining rendered dry enough to retain the full benefit of manure from the animals fed thereon, which, added to the natural goodness of the soil, produces the most wonderful fertility. The other sort of rich marsh land is such as still continues to be overflown by the flood-water of large rivers several times in the winter, and appears to derive its plenteousness from the fertilizing qualities of the water, and might therefore be properly called irrigated marsh. The soil of some of the best of the latter sort is very thin, and such as under other circumstances makes some of the worst land in the kingdom. These two sorts of marshes are materially different, and clearly derive their fertility from very opposite causes. If the first be called drained or dry marshes, and the latter irrigated marshes, we shall make the proper distinction. In the first case it is necessary to keep the water off the surface, to prevent injury to the soil, and in the latter it must be kept on to support the growth of its grasses. The herbage of those lands will also prove on examination to be composed of very different grasses, and I believe their effects on cattle to be also different; for it is well known that some pastures will increase the quantity of milk, but have no fattening quality.—Dry marshes will therefore be most calculated for feeding, and those irrigated most profitable to the dairy. The largest part of the dry marshes in England are appropriated to fat neat cattle and sheep; but as the lands irrigated in the summer are unsafe for the latter, and often too soft to bear the tread of the former, they are so commonly mowed that my ideas of them may not be perfectly correct; but if such irrigated marshes are possessed of the quality of fattening animals, I should expect more benefit from them in the spring and in the early part of the summer, than in the latter or autumn. We may see by the different marshes and low meadows that are every winter under water in various districts, how some places thus situated are improved and others injured; hence we ought to learn the management of such overflowings; for irrigation (though a most excellent system) when carried to excess, or defectively performed, produces the worst consequences. There are numerous instances by the sides of rivers, where lands are greatly benefited or much injured, by being flooded from the same water, and for which evident contrast there must be an assignable reason. That the defects of vegetation are not deduced from any difference in the quality of the water is certain, and probably not in the difference of soil. The various effects on vegetation then must arise from the various quantities of water — its depths—the time it remains, or the velocity with which it passes over the surface. That there are many instances of extraordinary fertility in low meadows, which are inundated by rivers, where the tides and freshes meet, cannot be doubted; and some producing such abundant herbage, are upon under soils so totally different from each other, as to induce me to suspect that the meadows have derived their fertility from the quality and quantity of water, and not from either the soil or sub-strata. If these remarkable instances of fertility are produced from such sources, which I am much inclined to believe, this is a species of irrigation which we have not yet endeavoured to imitate. The facts are well known, though I have seen no observations upon them, for I may say there are but few rivers where some such instances cannot be found. These are the meadows which are generally called marshes, and sometimes salt marshes, and such as in many districts are famous for fattening cattle at an early period of the spring, when no other grass can be obtained. There appear to be many causes combined to form such meadows. As the width of the valley, or shape of the ground, at that particular part of the river, for it often happens that the flood-way or space which its water overflows may be too narrow to produce meadows of this or any other description; or a town or village may be situated on that particular part of the river, and occupy the place of such fertility; but even where the ground may be favourable for the production of such meadows or marshes, much may depend on the quantity, quality, rapidity and duration of the overflowing water, and the proportions of salt and fresh water of which it is compounded. Though much of the fertility may have been attributed to the apparently rich mud, which many rivers deposit at the place, where the tides and freshes meet, I can enumerate some instances where no such sediment has been deposited, which prove that the vegetative fruitfulness of

such meadows is much more dependant on the quality of the water than the quality or quantity of sediment deposited, consequently such compound water as generally overflows these fertile marshes is worthy of a chymical analysis. From such scientific investigation, I should expect to find it very practicable to imitate this species of irrigation, where marshes are below the level of salt and fresh water, and where both can be obtained in sufficient quantities. If the chemists' report on this fertilizing quality of such water should be equal to my expectations, that method of compounding water, for the purposes of irrigation, may be productive of very great and valuable improvements. The quantity of each might be easily regulated by the sluices for its admission, and a chymical test or instrument might ascertain its quality. Observation and experience would soon furnish a guide to the proper time of application. I am convinced, from a knowledge of the marshes in east Norfolk, and other parts of the kingdom, subject to inundations of the ocean and those of great rivers, where a variety of compound water must be formed, that none of these are productive of good, without a seasonable application. The instances of extraordinary good meadows, on such a great variety of sub-strata, are sufficient to prove that marshes of every description of under soil are capable of much improvement. Salt itself being known to be a most valuable manure, I do not see why, in many cases by the sea side, machinery might not be erected, to throw up sea water for irrigation. The portion of salt water for agricultural uses must be small, and therefore easily obtained for a large proportion of land, and applied at particular seasons in proper quantity, might destroy an astonishing number of small plants and insects, which would be converted into manure. I apprehend this may be one of the ways in which salt water improves land. The moisture which the salt absorbs from the atmosphere, may be another. Putrefaction being known to be one of the greatest sources of manure, and fresh water in the summer months also to engender much animal and vegetable matter, which becomes highly putrescent. Where both sorts of water can be procured for irrigation, it might be well to float the land with fresh water long enough to produce animalculæ, and then with salt water to destroy them. Perhaps some of our old agriculturists may think these hints too theoretical; indeed I am aware that every new idea must be liable to such appellations, but however that may be, I hope every one will allow that the proposed experiments are not complicated or expensive, but such as may be easily tried, and probably enable us to discover the true cause of the extraordinary rich vegetation of overflown meadows, at the meeting of the fresh and salt-water floods. The good effects of water on one part of a marsh may be very visible, while the ill-effects on the opposite part may be equally conspicuous. Instances might be enumerated on the Waveney and other rivers, where the evils arising to vegetation, from a redundancy of water, proceed not only from the floods, but the land springs. The benefits or evils produced by water can never be more clearly depicted than at this time of the year, (April) nor in few places more so than in the vicinity of Norwich and Beccles.

"It must be evident to every one who passes over Gillingham dam in the spring, that the overflowings of the river do much good to the adjacent part of the marshes, while the surplus water, from the upland, is equally prejudicial to the opposite side of them. The advantages to the part near this river, like most others, arise from water flowing over the grass, while disadvantages to the other side, as clearly arise from too much water lying under them. The causes of good and bad quality in the marshes being known to proceed from water, we hence can tell how it ought to be applied. It appears, therefore, that the redundant water of one part of the marshes ought to be drawn away from the roots of the grasses; and some of the surplus water from the other, added to their shoots, and that this is an improvement easily affected, no one can doubt who is acquainted with the situation of the marshes and low meadows which are overflown by a river.—It is therefore certain, that the improvement of low lands and marshes, by the sides of rivers, would be an object of the greatest importance to the owners and occupiers of all the dry lands on each side of the valley, beside the advantages to the proprietors and occupiers of the marshes. Indeed there is not much land within the vale of the Waveney, or the vallies which communicate with it, particularly in the county of Norfolk, that is worthy the name of meadows. It is true that nature has furnished the owners of these watery districts with a few specimens of her best productions, which it is hoped the good sense of the proprietors and occupiers will soon endeavour to imitate. The most perfect specimens of good meadows which have come within my observation, are near Ditchingham dam and the lower locks at Shipmeadow mills. It may be said that those near Ditchingham dam were not so fertile by nature, but have been materially assisted by the number of cattle that have been annually fed on them; but the luxuriance of the grasses which grow in the horseshoe meadow at Ellingham, cannot be attributed to any effort of art. In these two instances we have, therefore, a fair specimen of what has been done by each of those prolific powers; but it will be clearly discovered, by any discerning man, that no art could have accomplished the improvement which has been made in those good meadows near Ditchingham dam, if they had not previously been dry enough to retain the full benefits of the manure which they have received. Hence it is evident, that drainage is the first step towards this most desirable improvement of all low meads and marshes. To accomplish which, without some injury to those interested in the water passing through such vallies, may be difficult.

"The locks on the navigations and different mill dams on the rivers, may have formed considerable obstructions to the natural draining; if these are insurmountable, it may still be the interest of the land-owners to contrive the best means of improving their property without injury to such long established works; consequently the proposed benefits to land near those rivers where mills and locks are fixed, can only extend to the removal of injuries arising from the surplus water of such works, and it might therefore be reasonably presumed, that the proprietors can have no objection to such laudable attempts. Draining lands below the locks and mill dams, where the water of the rivers has to contend with the tide, must be accomplished in

a different way; for land that is below such level cannot be drained without sufficient imbankment to keep out the high water, and a sluice through it to let out the inner water when the tide retires; but in situations where there is not sufficient variation between high and low water to admit of draining by a sluice, then we must have recourse to machinery. Large wheels, furnished with scoops to throw up the water, and which are worked by sails like a common windmill, have generally been employed; but I see no reason why in many situations, other powers might not be substituted to advantage: but these requiring to be great, nothing but steam and water can be applied; the first is too often an expensive power, on account of the high price of coals, and the latter is too frequently unattainable where draining by machinery becomes necessary. There is now no natural outfall sufficient to drain the marshes of East Norfolk and Suffolk, estimated at 50,000 acres, nor any reason to expect that the mouth of Yarmouth haven, or the course of the river Waveney, will be so much improved as to discharge the water from its level of marshes during the return of the tide. If there be no prospect of benefiting the state of these and many similar situations by an improvement of the natural drainage, recourse must then be had to artificial means—imbankment and machinery; and the banks to inclose any portion of such marshes from the general level, to drain it thus, must not only be made high enough to keep out the highest floods that have happened, but also all floods which may occur when the space which the water has to flow over, becomes contracted. If similar imbankments should be made to improve the marshes on both sides of a river, it is evident that the water which spreads over a great width in such contracted space, must then rise considerably higher; and also that any local imbankment of such marshes which contracts the waterway of the floods from the last fall or mills on a river, to its out-fall at sea, must have a tendency to dam up the water on the unimbanked parts above. Thus when one part of a level of marshes is benefited by keeping out the water, the other parts must be proportionally injured by increasing the quantity of it, especially such lands as lie between the imbankments and the source of inundation; and when, by an improvement of any lands above the tide-way, the water which used to lie on them has been more readily discharged, the inundation of lands in the tide-way must be considerably increased. Hence it appears that all lands which are so circumstanced, may be liable to much inconvenience from the means adopted to improve the lands both above and below. These observations are applicable to the low lands on most rivers, but more particularly to those in the eastern part of Norfolk and Suffolk."

Of Agricultural Powers and Implements, and the Uses to which they are applied.

There are now in practice, in our own country, two distinct modes of agriculture, which are known by the names of the *Old* and the *New*. The former is peculiarly characterised by minute attention to the state of the soil *antecedently* to the sowing; the latter to the state of the soil *afterwards*. The farmer, under the *old method*, takes especial care to plough, harrow, and pulverise his soil, and manure it with the richest dungs, before he deposits his seed, and having given it a soft and stimulating bed, believes that he has little to do afterwards; while the practitioner under the new method, which was first introduced by Mr. Tull, and is often called, from a power essential to its being carried into effect, *horse-hoeing husbandry*, conceives that at least as much benefit is likely to result from frequently re-ploughing or hoeing the soil afterwards, from softening it, and especially from freely exposing it to the influence of the external air, as from previous preparation and dunging.

The precise difference of principle upon which these two opposite methods proceed, has never yet been pointed out; we shall, therefore, give it in a few words. We have already stated, that ammonia and oxygen are both of very great and essential use to the growth of plants. We shall have occasion to observe hereafter, that different plants require different soils, or soils differently prepared; but all of them flourish, according to the freedom with which these gasses are applied to them. It was till of late supposed that ammonia was more essentially useful to the growth of plants than oxygen, but it has of late years been very sufficiently proved that the latter possesses a more vital and invigorating influence than the former, and that a total deprivation of oxygen produces much more mischief to plants than a total deprivation of ammonia. Now as it is obvious that ammonia is chiefly derived from manure, and oxygen from the atmosphere, it is also obvious that the principle trusted to under the old method was, that ammonia is the most useful stimulus to vegetation, and under the new method that the most useful is oxygen; whence these two distinct systems of farming might properly enough be denominated the *ammoniacal* and the *oxygenous*.

Those who object to the frequent ploughings in the new husbandry, seem afraid that it will make the soil too dry, in consequence of the larger surface that is hereby exposed to the air and sun. A stagnant wet, however, is well known to be more injurious to vegetation than almost any degree of aridity; independently of which it is evident, from a multitude of experiments, that, even in the dryest weather, land cultivated according to the new method, continues moister than when managed in the old way; it more effectually absorbs and retains the dews and showers, and gives them an opportunity of soaking in to a greater depth.

It is after the manner of the new method that Indian corn is uniformly raised, the crops of which are so enormous. Mr. Tull asserts, that he has never seen an impoverished plant spring up contiguous to a well-hoed interval, unless overpowered by too great a multitude of other plants; but that they uniformly grow to an amazing size, when the earth around them has been frequently tilled. He mentions several instances in which the plants acquired an uncommon strength from the frequency of hoeing. In short, the stirring of the earth about the plants whilst they grow, is productive of such excellent effects, that, in some parts of this country, and in many places in France, they hand-hoe their corn, particularly wheat, and find that the crops amply repay all the charge and trouble of this expensive operation: which, however, cannot be performed but in well-peopled countries, Every husbandman will immediately see how much a hoe-plough is preferable for this work,

and that, to use it rightly, the corn must necessarily be planted in regular rows, as it is in the new method of husbandry.

It is obvious, however, that the longest-lived plants stand most in need of this culture. Perennial plants require it more than annual ones; and wheat which is sown in autumn, and does not ripen till nine months after, wants it more than spring-corn, which occupies the ground only for a few months. The former has to conquer a soil rendered hard during the course of the winter: but the other has not that difficulty to surmount; though both of them, and indeed all sorts of plants, are greatly invigorated by the repeated laying of fine fresh earth to their roots. Every farmer knows the vast efficacy of wood-land, before its native strength and vigour are exhausted; and such, in some degree, is that which this mode of cultivation furnishes; besides being constantly attended with the advantage of destroying weeds.

But these are not the only immediate benefits accruing from a due state of tillage; grubs, beetles, worms, and maggots of many different kinds, which abound in many fields, may be greatly diminished, if not entirely extirpated and destroyed, by the well-timed use of the plough, and its auxiliary instruments necessary to the reduction and due pulverization of the soil. Nothing so effectually prevents the ravages of the several tribes of subterraneous insects as the frequent stirring and crumbling the ground.

It is also observed by an excellent farmer (Mr. Wimpey) that the saving of seed in the modern practice is very great. It is very certain, says he, from experiments most satisfactorily authenticated, that about one-third of the seed which was formerly used, and indeed is still in most places, is fully sufficient. In general it produces a better crop than the whole quantity. In the old husbandry, or broad-cast method of sowing, it is usual to allow from two to three bushels of seed-wheat, as the season happens, to a statute acre; but in drilling or setting, as practised in the eastern counties, it is found that from three to five pecks is quite sufficient; so that the difference between the two modes of planting amounts at least to a saving of one bushel and a half per acre. If then these new modes of planting all sorts of grain were equally adopted, the saving, he conceives, would be an addition to the year's produce, of a tenth or twelfth of its whole amount. The farmer, therefore, who in any one year might plant one hundred acres of wheat in the new method, would save at least one hundred and fifty bushels of seed. If the savings of seed then on one hundred acres would be one hundred and fifty bushels, how amazing would be the amount of the quantity saved on all the tillage lands of Great Britain!

Duhamel observes in his Elements of Agriculture, that it is frequently more advantageous to increase the fertility of land by ploughing than by the use of dung The benefit derived from the latter he considers as limited, while scarcely any bounds can be set to the utility of the former.

It is for this reason, says he, that land intended for wheat is ploughed three or four times before the grain is sowed. Some farmers, who could not dung all their lands, ploughed part of them double the usual number of times, and reaped greater crops from these than from those which were dunged. The expence of the ploughing extraordinary will be much less than the price of the dung necessary for the land, if the farmer be obliged to purchase it. The farmer must not, however, think of practising the New Husbandry in land which cannot be brought to a fine tilth: for as no remedies are proper for all diseases, so no one culture can suit every kind of soil. In order, says the same author, to answer the ends of this husbandry, the seeds must be distributed so sparingly, that each plant may have room to extend its roots in such manner, that they may be able to collect an abundant quantity of food; each plant must be enabled to tiller greatly, so as to produce a considerable number of stalks; and each stalk must be enabled to bear a fine long ear, well filled with grain to its very point. And to effect the first of these qualities, the field, after being thoroughly ploughed and well harrowed, must be divided by furrows, the spaces between which may be of such breadth as shall be judged most proper. In the middle of these spaces, which will be distinguished by the name of beds, the wheat, or other grain, is to be sown in one, two, or more rows. An inch will be sufficient for the distance between the grains lengthwise of the row; though that may be somewhat less, if the ground be not very good for wheat; or, on the contrary, somewhat more, if it be excellent for that grain. By this distribution, each plant will find, in the intermediate spaces between the beds, and in the beds themselves, a sufficient extent of earth wherein to collect its necessary food; for those intermediate spaces, which I shall call alleys, must be wide enough to admit of stirring the ground in them while the plants grow: but to answer the second and third intentions, it is of consequence that these stirrings be performed at proper seasons, because each of them is to produce its particular effect.

It is likewise essentially necessary that the rows of corn be sown very straight; a circumstance which, though it be attended with some trouble, ought not to discourage the husbandman, because the great difficulty will be only the first time. After the ground has been once rightly sown, it will be easy to continue in the same regular track every following year. The only precaution necessary is, that the furrows be made as straight as possible, and that care be taken to leave a proper interval between one furrow and another, if three rows are to be sown. It will be right, when convenient, also to suit the direction of the furrows to the declivity of the land, that the water may drain down to the lowest part of the field, where a ditch should be dug to carry it off: and it will also be necessary to make them lengthwise of the field, if possible, that the less ground may be lost by the space which must be left for the plough to turn in.

After the seed is put into the hoppers of the drill, the horse which draws this instrument must be made to walk slowly in the furrow first made by way of guide: and in order to drop as nearly as possible the intended quantity of seed, the outlet of the hopper must be proportioned to the size of the grain.

The distance which Mr. Tull found to produce the greatest crops, was two rows upon a ridge of four feet eight inches, with ten-inch partitions.

Hoeing, is here an operation of the highest importance. It is performed in various ways,

and by means of different instruments, which will be described.

Land which retains water should be ploughed once about October, when the weather is fine. In doing this, a furrow should be first cut in the middle of the alleys, and then it should be filled with the earth on each side, even so far as to arch it up, and leave only a small furrow on either side, close to the beds, to drain off the wet, which would prove very prejudicial to the plants if it were to remain long near their roots. This loosening of the earth will also fit it for being mellowed by the winter's frosts; to which, however, care must be taken not to expose the roots of the corn, by leaving them too bare of mould. The most proper time for this stirring of the ground is when the plants have shot out some blades.

The second horse-hoeing, which should be given as soon as the hard frosts are past, that is to say, by the end of March, is intended to make the plants tiller; and will have this effect, if, after the earth near the rows has been stirred a little, that which was before laid up in the middle of the alleys, be returned back to the furrows at their sides. This earth, having been mellowed during the winter, will afford excellent nourishment to the plants now beginning to vegetate apace, and they will soon put forth their multiplied stalks.

The third hoeing, which is the second after winter, and is intended to strengthen the stalks, should be performed when the ears of the corn begin to appear. This culture, which is looked upon as the least important of all, and is sometimes even omitted without any great inconvenience, need not be any thing more than a slight stirring of the earth, in which it will, however, be right to begin to hollow the alleys.

The last stirring of the earth between the rows of corn is one of the most important, being that which makes the grains swell, and grow full bodied to the very point of the ear. The most proper time for this is when the ears begin to bloom: but as the corn is then high, only one furrow can be cut in the middle of the alleys, the earth of which should be laid up to the stem of the plants on each side. The plough will hardly be able to pass more than twice in this furrow, which should, however, be made as deep as possible, in order to bank up the greater quantity of earth. By this operation, the now fallow alleys are prepared for the next sowing; for it is in the middle of them that the corn is to be planted the following year; and the now eared wheat is earthed up, to prevent its being lodged; though in general corn thus cultivated is less apt to be beaten down than that which is raised in the common way, because the straw of this, being more exposed to the air, becomes harder and acquires a firmer texture, especially toward its bottom. It is for this reason that a tuft of corn which stands quite single, is scarcely ever beaten down by the weather.

When the corn is reaped, all possible care should be taken not to trample upon the adjoining ploughed ground.

It is well known, that vigorous plants do not ripen their seeds so soon as those which have been stinted in their growth: for this reason, the corn cultivated according to the principles of the New Husbandry ripens later than in the common way, and should therefore be sown somewhat earlier. We will now suppose that the crop is reaped, and that the same field is to be sown again with wheat the next year, and every year after, as it may be, because the rows of corn are placed each time in the middle of the former alleys, which have been ploughed during the whole year, without producing any thing. Thus, the only difference between this new method and the old husbandry is, that instead of resting, or fallowing, a whole field, whilst another whole field is under corn, and each of them separate from the other, the fallow here is in the same field as the corn, being interposed by means of alleys, which is the part rested between the beds, and is the part cultivated: but there is this great advantage here, that the stirring of the earth in the alleys which are not planted, not only prepares the soil admirably for being sown the next year, but invigorates the plants actually growing in the beds.

If it be thought proper to dung the alleys in order to prepare them for the reception of the seed, the dung, which should be thoroughly rotten, must be laid in the bottom of the deep furrow before made in the middle of them, and there covered with the earth which was thrown up towards the rows of wheat. If the land do not want dunging, this deep furrow is filled up without it; and this should be done immediately after harvest: that there may be time to give the ground another stirring, which need only be a slight one, before the sowing of the rows, which are now to be in the middle of the former alleys; and the alleys of this year will be in the place of the last year's stubble.

Though land, cultivated according to the principles of the New Husbandry, does not require so much dunging as that which is managed in the old way, yet this manure will always help to enrich the soil, especially if it be used in the manner here directed. By being thoroughly rotten when it is laid in the furrow, and there covered over immediately after harvest, it will have time to mellow and diffuse its influence, and not be apt afterwards to choke up the shares of the drill.

It is obvious, says Mr. Wimpey, that the improvement the soil acquires by means of frequent and well-timed tillage, must be gradual and progressive, and that the longer it is kept in tillage, if duly performed, the more fertile it becomes. He adds, that one ploughing in the beginning of winter, and a second in the winter, or early in the spring, will be more effectual in pulverizing and fertilizing the soil than half a dozen at any other time of the year.

This improvement in tillage, says he, is so very clear and certain, that it surprises one much that it is not universally practised. He therefore concludes, that these improvements in tillage may be considered of the greatest importance, as forming the basis or foundation on which the successful introduction of the several new articles of field culture depend.

Agricultural Instruments. In each method of husbandry, various instruments are necessary for facilitating their different processes. These consist chiefly of ploughs, harrows, rollers, horse and hand hoes, and drill machines, which are still more diversified by various modifications and constructions, in order to adapt them to particular purposes.

Ploughs are probably not yet arrived at the degree of perfection of which they are capable; they have, however, lately been very much im-

proved. Not long ago, Mr. Wimpey justly observed, some of them little more than scratched the ground; others were made so heavy and clumsy as to require great strength to work them; but that at present there are several in use which perform much better. Of this description are the Rotherham, the one-wheeled, the Norfolk, and the double ploughs. And of those which have been contrived for particular uses, that with two mould boards is highly useful. With this plough the open furrows for potatoes may be conveniently made, and the sets be afterwards completely covered by splitting the ridges. And when they have been horse-hoed, it again splits the ridges in the intervals, and earths up the plants. It effectually answers the same purpose in all broad drilled crops where the horse-hoe is used, and with half the labour performs the same work as could be done with the common plough, and in half the time which that instrument requires.

The *Miner* is a kind of plough which has lately been much employed in the cultivation of arable land in Lancashire, and is highly useful in opening the soil to such depths as may be thought necessary. It is made very strong, with a share only, without any mould board, for the purpose of raising the earth; it therefore loosens without turning up the soil, an operation which is performed still more effectually if two shares or coulters be added. In practice, it is made to follow the common plough in the same furrow, so as to penetrate to a considerable depth below the bottom of it. Anderson considers it as an extremely useful implement in lands that are capable of admitting it to work, and which no farmer should be without.

Common Plough. This is much in use in the North of England and in Scotland, and answers all common purposes tolerably well, especially the breaking up of stiff and rough land, where stones abound and hard strong clayey soils. The great length of its head gives it a pretty firm hold of the ground, while its weight prevents it from being thrown out by any obstructing substance; the length of the handles also gives the ploughman great command over it, and by the length of its mould-board it lays the furrow-slice well over.

The *Chain Plough* is likewise much in use in the northern parts of the kingdom. From the shortness of its head and mould-board, friction is considerably lessened, being only thirty inches from the point of the sock to the hind part of the head, and about eight feet from the point of the beam to the end of the handles. The sock and mould-board form a gently curving line, which prevents the gathering of earth. It is calculated so as to make a wide furrow without leaving any part unstirred. It is termed the Chain-Plough, from its being drawn by an iron chain fixed to the back part of the beam just before the coulter. This produces two advantages; which are, that by means of a muzzle it makes the plough go deeper or shallower, and that it causes less stress on the beam than if it were fixed at the end. This plough is proper for loams, coarse clays, and those tender soils which are free from stones. It may also be employed for opening pasture grounds, which have formerly been well cultivated.

Another chain-plough of smaller dimensions than common, and which is drawn by one horse, may be employed very advantageously for horse-hoeing where the land is mellow, which it ought always to be for this process. It is sufficient for making furrows to receive the dung, for ploughing the drills after dunging, and for hoeing the crop. A still smaller plough of the same kind may be recommended also for a kitchen-garden. It can be reduced to the smallest size, by being made of iron; and where the land is properly dressed for a kitchen-garden, an iron plough of the smallest size, drawn by a horse, will save much spade-work. Nor is this the only case where a single-horse plough may be profitably employed. It is sufficient for seed-furrowing barley, where the land is light and well-dressed; and it may be used in the second or third ploughing of fallow, to encourage annual weeds, which are destroyed in subsequent ploughings.

The *Rotherham Plough* is a machine of very simple construction, and easily worked. It consists of a beam, sheath, main handle, smaller handle, coulter, sock or share, bridle, sly-band, and a piece of wood in place of a head. The difference between this and the common plough seems to consist in the bridle at the end of the beam, by which the ploughman can give the plough more or less land, or make it cut deeper or shallower, in the coulter or share, which is so made and set as to cut off the new furrow without tearing; and in the mould-board, which is so shaped as first to raise a little, and then gradually turn over the new cut furrow with very little resistance. But the greatest advantage attending it, is its being so easy of draught, that it will do double the work of any common plough. An improved plough of this kind was a few years ago invented by Mr. Cook.

The *Paring Plough* is an instrument used in several parts of this country for paring off the surface of the ground, in order to its being burned, &c. The plough-beam is about seven feet long, morticed and pinioned into the block. The sheaths or standards are made flat on the inside, to close equally with the paring plate, and fastened to it with a bolt and key on each side. The paring plate of iron laid with steel is about four inches wide, and from twelve to eighteen long; and may be made to cut more or less deep by a contrivance for fixing the wheels nearer or farther from it.

Harrows. These instruments are commonly considered as of no use but to cover the seed; but they are also essential in preparing the land.

Many inconveniences, however, have been found to attend the use of harrows, even when constructed on the best common plans; whence Mr. Knight has been induced to form one upon a very different principle. His is made with wheels and an axle-tree, by which means it performs its work with much greater ease to the horses, and the undue stress on its fore-part, as well as its liability to be choked up, is prevented. It is constructed with two joints in the axle-tree, and two joints in the front of the bar, by means of which the pliability of the tree, and that of the bar, humour the wheels, and keep them in their proper directions in the furrow; and, requiring very little scope of ground, the turnings are rendered very convenient and easy.

Rollers. These implements are of great use in

husbandry, though scarcely known in ordinary practice; or, where introduced, they are commonly so slight as to prove very insufficient. Rollers are made of stone, cast iron, or wood; each sort has its peculiar advantage; that of wood should be constructed in the following manner: from the body of a tree, six feet ten inches long, make a cylinder. Surround this with three rows of fillies, one in the middle, and one at each end. Line these fillies with planks of wood equally long with the roller, and so narrow as to ply into a circle. Bind them fast together with iron rings. The roller, thus mounted, ought to have a diameter of three feet ten inches. It has a double pair of shafts for two horses abreast, and those are sufficient in level ground, though four may be necessary. The roller without the shafts ought to weigh 200 stone Dutch; and its large diameter makes it by no means difficult in the draught.

The *Spike-Roller* is also a very useful instrument for many purposes in husbandry. It is constructed nearly in the manner of the common roller, except in its having the addition of a great number of spikes.

Rolling wheat in the month of April is very important in a loose soil, as the winter rains leave many roots exposed to the air. Barley ought to be rolled immediately, especially where grass-seeds are sown with it. In a gravelly soil, the mould should be so dry as to bear the roller without clinging to it. A clay soil ought neither to be tilled, harrowed, nor rolled, till the field be perfectly dry. There is the greater reason for this precaution, because much rain immediately after rolling is apt to cake the surface when draught follows. Oats in a light soil may be rolled immediately after the seed is sown, unless the ground be too wet. In a clay soil, delay rolling till the grain be above ground. The proper time for sowing grass-seeds in an oat-field, is when the grain is three inches high; and rolling should immediately succeed, whatever the soil be. Flax ought invariably to be rolled immediately after sowing. The first year's crop of sown grasses ought to be rolled as early the next spring as the ground will bear the horses. It fixes all the roots precisely as in the case of wheat. Rolling the second and third crops in a loose soil is useful; though not so essential as rolling the first crop.

Rolling encourages the growth of plants, by bringing the earth close to their roots. It also keeps in the moisture, which is sometimes of great moment. And lastly, besides the foregoing advantages, it facilitates the mowing for hay; and it is to be hoped, the advantage of this practice will induce farmers to mow their corn also, which will increase the quantity of straw both for food and for the dunghill.

There are various other machines that have lately been introduced, with a view of facilitating the different processes of agriculture. Of these some are of greater, and others of less utility. We ought not, however, to close this section without noticing the *Threshing Machine*, which in some shape or other, has now found its way into the barns of every respectable farmer. It has of late been much simplified by the employment of cast-iron instead of wood; by which means it is also rendered much lighter to work, and does not occupy above a fourth part of the space at first allotted to it.

PART II.

CROPPING,

Or the Growth and Management of the Vegetable Products of a Farm.

Omitting many products of inferior importance, or less generally cultivated, we shall confine our attention in the part before us to the growth of

1. Grain, Pulse, Roots, Cabbages and Rape.
2. Grasses, properly and improperly so called, Hemp, Flax and Hops.
3. Ingathering, including reaping, haymaking and stacking,
4. Fruit-trees, Timber and Coppice Wood.

1. *Of Grain, Pulse, Roots, Cabbages and Rape.*—The articles of culture are commonly divided into two classes. The one consists of crops that are said to exhaust and impoverish the land they grow on; the other, such as ameliorate and improve it. This must be understood in a comparative sense; for, properly speaking, there are few, if any, vegetables that are carried off the land they grow on to be consumed elsewhere, but in some measure exhaust and impoverish the soil, and render it less fertile and less capable of supporting vegetation.

The first, or those which are supposed to exhaust the land most, are the fibrous-rooted plants, as wheat, barley, rye, oats, &c. The second, or the ameliorating, includes all the leguminous and tap-rooted, as beans, peas, vetches, turnips, parsnips, carrots, clover, &c. Modern improvements are much increased by a judicious succession of interchanges among these articles. An ameliorating following an exhausting crop, prepares the land for another exhausting crop, and especially if it be a hoeing crop; for by judicious management, the land may be constantly cropped for many years in succession, without the intervention of a fallow every third or fourth year, as has been too much the practice till lately.

Anderson remarks, that no crop succeeds better on harsh unmellowed soils than turnips. Perhaps it thrives better on these, with a sufficiency of manures, than on those soils that have been long under cultivation. This is therefore the best crop for the first on all newly broken-up wastes that are not of too clayey a nature. It not only mellows the soil, even perhaps more than a fallow, but affords a great deal of dung, which is an article of inestimable value under these circumstances.

In Norfolk, Mr. Kent in his excellent Survey observes, that the management and series of cropping are generally fixed under a six-course shift, viz. wheat the first year; barley or oats the second, without clover; turnips the third; barley or oats, with clover, the fourth; the clover mowed for hay the fifth; and the sixth grazed till midsummer, and then broken up for wheat in succession. The farmers, however, frequently endeavour to contract it to a five-course shift, by sowing their wheat upon clover of one year's lay; and in some of the best parts, some tenants carry on not more than a four-course shift; in this manner wheat, turnips, barley, and clover. This last is similar to the practice of a great part of Flanders, where the invariable method is to carry an alternate crop for man and beast; but as land though ever so

good, will grow tired of too frequent a repetition of turnips and clover, some inconvenience is occasionally sustained; to remedy which, they will do well who change the former of these now and then for a vetch crop, and the latter for trefoil or lucern. No course of husbandry can be more profitable than this, where the soil will allow it; and there are many parts of this county where it may be carried on without doing any injury to the land. Mr. Kent considers the five-course shift to be more unfair than the four; because, in this case, there are three crops of corn to two crops for the animal. This mode of cropping would be better, if the barley crop, after wheat, was sometimes changed for buck-wheat or potatoes, which would neither be an unprofitable or exhausting crop; and thus a little varied, the practice of a five-course cropping might be allowed, in the parts where the soil is good in quality; or where any extra quantity of manure can be procured, which is sometimes the case in the vicinity of towns, or near sea or river navigations, or where a gentleman occupies a park with a farm, or a farmer a large portion of down. But in the great western parts of the county, the course of six shifts ought to be strictly adhered to: and there is something very rational in this six-course husbandry upon a light soil; for though the exhausting and fertilizing crops do not follow alternately, as in the four-course shift, yet there is an equal number of each observed in the rotation. We agree, however, with this writer, that in the very light parts of the county a seven-course shift would be an improvement; but he does not mean by letting the land remain three years laid, as some have recommended, because the Norfolk land does not yield much profit from grass seeds after the first year; but he would rather recommend the following course: wheat, vetches, barley, buck, turnips, barley, clover; this would keep the turnips and clover crops at such a distance, that there would be no fear of their success; and, as the buck might be considered as a neutral crop, the alternate advantage would not in fact be lost in its good effect. He belives too, that by means of the vetches, which might be fed off the whole summer, more stock would be kept on very light land than from the present six-course shift; and where a flock is kept, it never can be employed so well, as in penning upon this sort of light land, as soon as the wheat or rye is sown, especially if the sowing be upon one ploughing; in such case, it is best to begin rather early, and sow by degrees as many ridges each time as the breadth of the fold will cover or contain.

Wheat. This grain is less particular in respect to climate than most other kinds. It not only thrives in temperate, but also in very hot, and very cold regions. In general, however, wheat succeeds best upon strong soils, especially if they have been well drained, so that the corn lies dry.

"The most advantageous mode of cultivation for this valuable grain is probably not yet fully ascertained. It may, however, be profitably sown either after preparing the land by fallowing, or after crops of turnips, potatoes, &c. and on ground from which a crop of clover has been taken.

"Various sorts of wheat are cultivated in different parts of the country. Of the old sorts we may mention the brown and yellow lammas; the white straw, Fulham, and the white or egg-shell.

The first is the common brown-strawed wheat, which grows with a long jointed ear, the chaff of a dark brown colour; the straw long and apt to fall; the hull or bran thin, the flour very white, and the corn mellow in grinding; for which reasons it is esteemed by the millers as the best of the old sorts for their purposes. The yellow lammas resembles the brown in every respect, except that the colour of the grain is of a yellow hue, and the chaff of a somewhat lighter tint. And the white strawed wheat takes its name from the colour of its ear; in other counties it bears the appellation of the Kentish white straw. This kind sends out a greater number of stems from the stool, or plant, than the other sorts; and by that means is often a very thick crop on the land. The straw is generally somewhat shorter than that of many other kinds, and not quite so liable to fall in rainy seasons. It is on these accounts much sown in the eastern part of the county; but, from its dull colour, its having a thick bran, and often grinding very steely, the millers do not seem to approve of it. The Fulham also produces a white straw, which grows short and coarse: this kind is very productive, especially on poor land; but the grain is very coarse, and the bran thick: from which circumstances it is by no means so valuable to the millers as the other kinds. The white, or egg-shell wheat, is known by its producing a white straw, a smooth white chaff, and very white grain; the bran of which is somewhat thick, but the flour remarkably white. It works mellow in grinding, is very early ripe, and so free in the ear as to blow out in windy weather. This kind, from rich sandy loams, is often a beautiful sample, in which case it brings the highest price of any of the different kinds.

The new sorts of wheat, or those which have been introduced into the county within the last thirty years, are the hoary white, nonpareil, pilbeam, square ear, and hoary brown. The hoary white, by some called the velvet eared, is by far the most valuable, because it is very productive, and the best for the miller's use. The straw is white and short, the chaff is covered with a thick fine down, somewhat of a brownish hue; the grain is remarkably small, and of a dull white colour; the bran very thin, so that some grains are almost transparent when held up to the light. It grinds very mellow, and makes a beautiful fine white flour. From the quantity of down upon the chaff, and its small ears binding up very close in the sheaf, this kind, in a rainy season, is apt to vegetate very freely in field; on which account it is not so proper to cultivate in a moist climate, and in small inclosures, that are not open to the sun and winds.

The nonpareil is said to have been brought into this country from America; it has a bright straw with a brown ear; and the grain is very white, large, and plump. It is very productive on all soils, thrashes very free, and yields, in that operation, the greater part of its chaff; thereby producing a great quantity of horse-meat. It grinds very mellow, and the millers consider it as a good kind.

The pilbeam is a brown wheat, growing very stiff, and generally thick on the land. The grain is small and plump, somewhat of a yellow brown. It is said to be very productive on rich lands, and is a valuable kind to mix with others, but

will not of itself make a good loaf of bread, from its not working properly in the act of fermentation. The square eared is a very productive kind; but, from its being apt to drop out in the field before it is ripe, and consequently to blow out in gales of wind, is not much cultivated. The hoary brown has been but lately introduced and therefore its properties are not fully ascertained.

The best time for sowing wheat would seem to be about the beginning of September, especially if rain have fallen; as it is a general practice among farmers to make choice of a time for sowing their wheat when the earth is moist, and writers on agriculture have also in general recommended the practice.

It must moreover be observed, that early sowings require less seed than late ones, as the plants then rise better, and acquire strength to resist the severity of the winter. More seed should always be allowed for poor lands than for rich, because a greater number of plants will perish on the former. Rich lands, when sown early, require the least seed of any. There is also another circumstance which the husbandman should carefully attend to in sowing; which is, that his estimate of seed be formed, not from the capacity of any particular measure, but from the number of grains which that measure will contain; because the grains of some growths of wheat are much larger than those from off other lands, though of the same species, and perhaps equally good. By not considering this, the ground must frequently be sown too thick, or too thin; though farmers are seldom apt to run into the last extreme. Instead of the usual allowance of three bushels of seed-wheat to an acre of land, repeated trials have shown that half that quantity is generally more than sufficient: it is a common practice to sow more seed upon new broken-up ground, than upon that which has been long in tillage. From half an inch to three inches is the usual depth at which wheat is planted, according to the nature of the soil; the stiffest lands requiring the shallowest sowing. The general custom is, to sow it under furrow, which is certainly most advisable, if the soil be shallow, to prevent the plants being thrown out by the winter's frosts, or their roots being left bare by the drying winds in the spring. Some sow in broad-cast, either with a single cast, or double bout, harrowing once between; after which the ground is again harrowed several times, till the seed be well covered. In this manner of sowing, however, a great deal of it will become the prey of the birds. And in planting the corn deep, there is great danger of its being eaten off by worms between the grain and the blade of the grain.

The most advantageous plan and which of late years has been gaining ground very considerably in almost all parts of the country is that of *dibbling*, either by the hand, or by spiked and drill rollers imitative of the process pursued in real dibbling. Wheat thus planted is better bodied and much heavier, dilates its shoots wider, and covers a larger space than ever occurs in broad cast; the ears are also larger, and more numerous, every separate shoot sending forth its distinct culm or stem.

It may be remarked on the authority of many farmers who have employed this method, first, that the produce is more by ten or twelve bushels an acre than by the former method, particularly if the set wheat is hoed. Secondly that it is less liable, to misfortune, such as lodging, after heavy rains, mildews, &c. Thirdly, that the straw is stouter and the grain bolder, and consequently will bring a better price. Fourthly, that by employing so many poor children, the parish rates are considerably diminished.

Blight, mildew, smut. These are the diseases to which wheat, and indeed other grains are peculiarly subject, but which is often terribly destructive to the former. The exact cause of this we know not; nor whether the three be distinct diseases proceeding from different sources or from one common source. The former is the more general opinion, though Wildenow and most of the Linean school have arranged them as diseases produced by different funguses.

The best paper we have had upon this subject, is one published in 1805 by Sir Joseph Banks, in consequence of the alarming state of the preceding harvest. This very able writer ascribes the whole of these mischievous effects to one common cause, operating in a different manner, and in different degrees. This cause is a fungus, of which he has given a magnified drawing, which he supposes makes its way into the young leaf of the plant before its straw rises, and which by spreading insinuates itself at length into the cellular substance of the straw, robbing the kernel of its nutriment as it ascends; whence, though the ear will be formed, the grain will have little or no gluten, and according to the degree of mischief it sustains, may preserve its shape and retain its glume perfect, or even have the latter destroyed and reduced to a red or a black powder. It is affirmed that the barberry-tree peculiarly gives rise to this fungus: but even this is uncertain. See Mucor and Uredo.

Wheat may be said to be ripe when its straw is turned yellow, its years hang, and are destitute of greenness in the middle of them, and the grain is hard on being bitten. It was formerly a custom among farmers, to delay reaping their wheat till it was very ripe. But they now mostly reap it earlier, and do not let it stand to be so ripe as formerly. They indeed find their account in cutting it greener; for such wheat has a better colour than that which is thoroughly ripe, and consequently sells for a higher price. It is also probably heavier in the bushel.

A produce of from four to five quarters an acre is reckoned a good crop: but it can hardly be credited how much beyond this the produce of good ground, thoroughly well cultivated, may be increased. Mr. Miller assures us that he has known eight and ten quarters, and sometimes more, reaped from an acre, over the whole field, where the corn has stood thin upon the ground; and that he has been informed by persons of great credit, that even twelve quarters have been reaped from an acre of land drilled and managed by the horse-hoeing husbandry.

The most favourable season to get in harvest, is afforded by hot and dry weather; as the quality of corn is hereby improved, and the grain rendered much fitter to keep, by the sun's having acted powerfully upon it, either towards the latter part of its standing, or just after it has been cut.

Rye. This grain is much cultivated in some of the northern counties. It is distinguished into two kinds, winter and spring rye, and in some parts of the country by the names of black and white, or Dantzic rye.

Winter rye is the largest grain, and what the

generality of farmers cultivate. It is usually sown in autumn, or at the same time as wheat; and in some of the northern counties they are frequently mixed and sown together; but this seems to be bad husbandry, as the rye ripens much sooner than the wheat. Rye is generally sown on poor, lime-stone, dry, gravelly, or sandy soils, where wheat will not thrive, and in such places it does very well. The ground should be dry when it is sown, as in wet seasons it is liable to rot in the earth. It rises in a much shorter time than wheat. If sown upon light land, it ripens much earlier than on cold stiff ground, and by continuing to sow it in such a soil during two or three years, it will be forwarded so much as to ripen a month earlier than that which has been long raised upon strong cold ground. For this reason, those who are obliged to sow rye toward spring, generally provide themselves with this early seed. A little sprinkling of dung or mud, though it be but half the quantity commonly used for other corn land, will, if laid upon the rye ground, greatly advance the crop. The allowance of seed is commonly about two bushels to a statute acre.

The small rye is sown in the spring, about the same time as oats, and generally ripens as soon as the other sort: but if the season prove wet, it is apt to run much to straw, and the grain is generally lighter than the other. The chief use of this sort is for re-sowing land where the autumnal crop has failed.

Rye is ripe when its straw turns yellow, its ear hangs, and its grain is hard. If this grain be cut in perfectly dry weather, and be destitute of weeds, it may be housed almost as it is reaped.

The principal use of rye is for bread, either alone, or mixed with wheat, in which it is called meslin corn. If sown only for dressing of land, it is of vast service to the ground where it is ploughed-in green and succulent. This plant is likewise sown in autumn to great advantage, purposely for green food for cattle, particularly for ewes and lambs in the spring, before there is plenty of grass. When this is intended, the rye should be sown soon, that it may have strength to furnish early fodder. In this way it supplies the want of turnips where they have failed, or where their season is over: so that in such cases, it is very good husbandry to sow the land with rye, especially where there are flocks of sheep which cannot be well supported without green food early in the spring.

Buck-Wheat. This will thrive in any kind of land, even in the poor sandy soils, but grows largest in light dry gound which has been well ploughed. When raised for its grain, a bushel of seed is sufficient for an acre of land; but when intended for green fodder, which is the use made of it in many places, some farmers sow three or four bushels on an acre, in order to have a thick crop. The common time of sowing it is about the beginning of May; it may however be sown considerably later; but if it be sowed somewhat earlier, and a warm season ensue, it will bear cutting twice in the summer. The method of ploughing buck under, and the after management of buck-fallows, is nearly as for wheat, and the harvest process is like that of barley. This grain is an excellent food for pigeons, poultry, hogs, rabbits, &c. and is found to make horses thrive when given among their oats; but for these purposes it should be first bruised in a mill. The flour of buck-wheat is very white, and when mixed with a little wheat-flour, the poor in some countries make bread of it.

Barley. This grain is generally sown either after a fallow, or on an ersh or second crop. If after a fallow, the land must be ploughed at least three times; and at the first ploughing, it should be laid in small ridges, and in that manner remain during the winter for the frost to mellow it: but if another ploughing can be given it in January, or in the beginning of February, the ground will be still much better broken and prepared. In March these ridges should be split, the ground well harrowed and laid as smooth as it can be, and if possible ploughed again the same day, in order to sow. But in strong wet lands, the best way is to lay it round, and make deep furrows for the purpose of draining off the water.

Some farmers at the time of twifallowing in June, make the land very fine, and sow it with turnips, which they feed sheep with in the winter: and in March plough it up, and order it as before; but others who take this method of sowing turnips, give it only one ploughing, in March, just before they sow. And those who sow barley upon an ersh, after wheat, plough up the wheat stubble in as dry weather as they can, as soon as the time of sowing wheat is over. They lay three ridges into one, if they have dung to spread upon it: but if they have not, they plough it in small ridges, that it may be the drier, and the better mellowed by the frost: they then plough it up again in March, and order it as before. Some sow their barley on small ridges and others on broad lands; when the latter are used they cannot be laid two round.

Clover may sometimes be advantageously sown with barley; but this practice is not suitable for poor light soils. As the clover in wet seasons is frequently liable to overpower the barley, it has been advised to sow the clover a month after the barley, by which means it is prevented from being too rank. In Norfolk the barley, after turnips, is generally sown upon a third ploughing, and the grass seeds with it; and as the ground has been effectually cleaned by five ploughings the preceding year, it is generally in a fine state when laid down in this way.

Various sorts of barley are cultivated, but the spring barley, with a double row of erect beards or awns, is the sort principally grown in England, of which the farmers make two varieties, viz. the common and the rath-ripe; the latter however, is only a diversity of the common barley, occasioned by being long cultivated upon warm gravelly lands. The seeds of this, when sown in cold or strong land, will, the first year, ripen near a fornight earlier than the seeds taken from strong land, therefore the farmers in the vales generally purchase their seed barley from the warm lands; for if saved in the vales two or three years, it will become full as late in ripening as the common barley of their own product: and on the other hand, the farmers on the warm lands are obliged to procure their seed barley from the strong lands, otherwise their grain would degenerate in bulk or fullness, which, by this change, is prevented. This sort of barley is easily distinguished by the two orders of beards or awns, which stand erect; the rind is also much thinner, and consequently better esteemed for malting.

Another sort, the long-eared barley, is also cultivated in many parts of England, and is a very good kind; but some farmers object to it,

because they say the ears being long and heavy, it is more apt to lodge. In this sort of barley the grains are regularly ranged in a double row, lying over each other. It has no beards or awns, is very thin in the rind, and esteemed for the process of malting.

The sprat, battledore, or Fulham barley, is a kind which has shorter and broader ears than either of the former sorts; the awns or beards are longer, which tend greatly to preserve it from the birds, and the grains placed closer together. This seldom grows so tall as the other kinds, and the straw is coarser.

Winter-barley, square-barley, bear-barley, or *big,* is seldom cultivated in the southern parts of this country; but in the northern counties it is frequently sown, as being much hardier than the other sorts. There are two kinds of this barley, the one with four, and the other with six rows of grains. The grain is large and plump, but the rind thicker than that of either of the preceding sorts, which renders it less valuable. These last two kinds of barley are generally sown in the autumn, about the same time with wheat. In Kent only two sorts of this grain are cultivated; the common long-eared English barley, and the short-eared sprat barley; the latter is only sown on some of the richest parts of the soil, where the common kind is likely to grow too stout, and fall. The quantity of seed usually sown in the common way is four bushels per acre; but if a drill plough be used, three and a half is enough.

The usual time for sowing barley is in March, April, or the beginning of May. It is generally thought most advisable to sow light lands the earliest, and to embrace the first dry season that offers for the purpose: dry weather being best for most summer corn. Clayey grounds, and lands subject to weeds, generally produce the best crops when sowed late.

The most suitable soil for barley is that which is dry and healthy, rather light than stiff, but yet of sufficient tenacity and strength to retain the moisture. On this kind of land the grain is always best bodied and coloured, the nimblest in the hand, and has the thinnest rind. These are qualities which recommend it most to the maltster. If the land be poor, it should be dry and warm; and when so, it will often bear better corn than richer land in a cold and wet state.

The common method is to sow the barley seed with a broad-cast at two sowings; and the first being harrowed in once, and the second until the seed is buried; the common allowance of seed is four bushels to an acre: however, if the farmers could be prevailed upon to alter this practice, they would probably soon find their account in it; for if a third part of that quantity be sown, there will be a much greater produce; and the corn will be much less liable to lodge. This saving of seed corn is a very considerable object. But if the drill method were employed, it would be still greater, for in that case an eighth part of the seed would only be required.

From the great success which has attended the setting and drilling of wheat in Norfolk, some farmers have been induced to try these methods with barley, which seemed to answer very well on rich lands, and on others they would probably be found equally advantageous, if proper attention were paid to the practice, as the grain is certainly finer when cultivated in this way.

In respect to the choice of seed it is necessary to observe, that the best is of a pale lively colour, and brightish cast, without any deep redness, or black tinge at the tail. If the rind be a little shrivelled, it is the better; for that slight shrivelling proves it to have a thin skin, and to have sweated in the mow. The necessity of a change of seed, by not sowing two years together what grow on the same soil, is not in any part of husbandry more evident than in the culture of this grain, which, if not frequently changed, will grow coarser and coarser every year that it is continued. But in this as well as in all other kinds of grain, the greatest care should constantly be taken to have the seed full-bodied.

In many counties the steeping of barley before it is sown is not practised. It is however supposed by some farmers, that seed-barley may be benefited by steeping; though liming it is generally prejudicial. A small quantity of soot mixed with the water in which it is steeped, seems of service in preserving the seed from insects.

When the barley is sown and harrowed in, the ground should be rolled after the first shower of rain, to break the clods and lay the earth smooth; which will cause the earth to be closer to the roots of the corn, and be of great service to it in dry weather. This may be done by the spike-roller with great convenience. And when the barley has been up three weeks or a month, it will also be a very good method to roll it over again with a weighty roller, which will press the earth close to the roots of the corn, and thereby prevent the sun and air from penetrating the ground, which will be of great service in dry seasons. This rolling of it before it stalks, likewise will cause it to tiller out into a greater number of stalks, and if the plants should be thin, make them spread so as to fill the ground as well as strengthen the stalks.

When this grain grows too rank, as it sometimes does in a wet spring, mowing is much better than feeding it off; as the scythe removes only the rank tops, whereas the sheep feed upon all indifferently, and are particularly fond of the sweet end of the stalk next the root, consequently may injure the growth of the plant, by biting it too closely.

This grain is ripe when the red roan, as the farmers call it, or the reddish colour on the ear, is gone off, when the ears droop and fall, as it were, double against the straw, and the stalks have lost their verdure. Barley should never be housed till thoroughly dry, lest it mow burn, which makes it malt worse than if it had spired in the field.

Oats. This kind of grain is very hardy, and will thrive in almost any soil. There are several sorts cultivated in England, as the white, black, brown, or red, and the naked oat. The white is the most common in the southern part of the country; but the black oat is more cultivated in the northern, and is esteemed a very good food for horses. Red oats are much grown in Derbyshire, Staffordshire, and Cheshire. They are a very hardy sort, and yield a good increase, especially on strong lands. The straw of these oats is of a brownish red colour, as is also the grain, which is very full and heavy, and esteemed a better food for horses than either of the other sorts. The naked oat is not common in the southern parts of this country.

In the county of Kent, the large Poland, the

Brue, the Tartarian white, the Siberian, the Devonshire black, the red and the grey oats are chiefly cultivated.

The time of sowing oats is February or April, according as the season proves early or late, and it may always be right to sow the largest grained sort the earliest.

Oats are frequently sown after a crop of wheat, rye, or barley: in which practice the common method is to turn in the stubble, with one ploughing, about the beginning of February, and sow the seed with a broad-cast at twice, harrowing it in once after the sowing, and five or six times after the second, observing to draw the harrow once or twice across the furrows, to break the clods and cover the seeds: but at the other times to harrow in the same direction as the furrows, lest the stubble should be raised on the surface. But it would probably be much better husbandry to plough in the stubble in autumn, that it may rot in winter, and to give the land another ploughing and a good harrowing just before the oats are sown. This will render the gronnd finer, and fitter to receive the grain, and the increased produce would amply repay the extraordinary expence of tillage. It is also necessary to observe, that oats, which impoverish the ground, should always succeed some one of the meliorating crops, by which means a more plentiful crop will be produced than in the common way.

When oats are sown upon lay, or on ground newly broken up, as is frequently the case after only one ploughing, given in January, when the earth is moist, to turn down the sward; the harrowing must be in the same directions as the furrows, or but very little across, for fear of raising the turf. But this is bad husbandry: for the ground would be brought to a much better tilth for other grain, as a preparation for which this sowing is chiefly intended, by giving the sward time to rot before the oats are sown.

Black oats thrive better in a moist soil than the white sort, and being a hardier plant, may be sown a month earlier. The white, which prefer a dry land, and will do well on gravel and sand, are the best of all grain for ground subject to quick-grass or weeds, because it may be ploughed later for them, and they rise sooner, and top the weeds better than black oats. The weather cannot scarcely be too dry when white oats are sown. The red and the white clayey soils, when in good heart, carry moisture enough, and are very fit for this kind of grain. The common allowance of seed oats is four bushels to an acre, but less may probably be sufficient.

The Tartarian are a very late sort, but very productive; though extremely light, and consequently not much esteemed. The Siberian black oat is a very large, long grain, but liable to drop out in the field: it requires as good land as the white oats, but, from its colour, is not quite so valuable. From the large size of the grain, it is necessary to sow five or six bushels per acre. It is sown early, and is a very forward sort. The small, or Devonshire black oats, are most commonly sown on chalky downs, and being very hardy, will grow on almost any poor soil; though it is the most productive on good land, and such as is in fine tilth. Four bushels per acre is the common quantity sown on the poor lands of this country; but some farmers on very bad land frequently sow more: that quantity, however, is quite sufficient if the land be perfectly clean. This sort of oat being hardy, and ripening late, cannot be sown too soon, provided the land be dry and in a proper state. The red oats are but little cultivated; when they are, it is chiefly on the poor cold stiff lands: their straw is said to be particularly valuable for cutting into chaff.

The Grey oats are a very long, thin, poor, light grain, and are chiefly cultivated on account of their producing a large quantity of straw, on very poor land, for the purpose of cutting into chaff for horses. They must be sown early.

When oats are about four inches high, it is a custom with some husbandmen to run a wooden roller over them, after a shower of rain has softened the clods, by the breaking of which, in this way, fresh earth is laid to the roots of the plants, and their tillering is considerably increased, if they have not been sown too thick. Both oats and barley should be carefully weeded.

This kind of grain is ripe when the straw turns yellow, the corn becomes hard, and the chaff begins to open and shew the seed. Oats may be housed the wettest of any corn, if the weeds among them be but dead. For in very rainy harvests, when other grain is spoiled, this will receive little or no damage, the surface of its straw and ears being so smooth and compact as to turn off water, and of so dry a nature, that, though housed wet, they will not heat in the mow, or become mouldy, as other grain commonly does.

Peas. Of this pulse, many different sorts are cultivated. The small tender sorts are generally improper for a cold soil; and the large sorts on account of their great haulm, are unadapted to strong rich land, as their haulm will increase to too great a length, and not be able to bear pods. They pod best when sown on a mellow mould, rendered light by ploughing.

The common white pea is most suitable for light sandy land, or a rich loose soil. It is generally sown with a broad-cast, and only harrowed in. Three bushels of these peas are the common allowance of seed for an acre; and the general time of sowing them is about the latter end of March, or the beginning of April, on warm land; but a fortnight or three weeks later on cold ground. When sown in drills, which is probably the best way, a bushel and a half of seed is sufficient for an acre. When they are thus set regularly, the ground can be stirred with a hoe, to destroy the weeds, and earth up the plants, by which they are greatly improved, and rendered much easier to cut when ripe.

Green and maple rouncival peas require a stronger soil than the white, and should be sown a little later in the spring, and considerably thinner, as they are apt to grow rank, especially in wet seasons. When sown in drills at the distance of a foot and a half, the ground between the rows should be stirred two or three times with a hoe, which destroys the weeds, and renders the land fitter for whatever crop is put on it the following season.

For grey and other large peas the best time of sowing is about the beginning of March, when the weather is pretty dry; for if they are sown in a very wet season, they are apt to rot, especially if the ground be cold. When sown by the drill, the distance between the rows should be about three feet, and the peas be sown thin in the rows: for if too thick, their haulm will spread

so as to fill the ground, and ramble over each other; by which means many of the plants are rotted, and hindered from bearing. The common allowance of these large peas is two bushels to an acre: but this is certainly more than is necessary. Grey peas thrive best on a strong clayey land.

In different parts of Kent the Reading and Leadman's dwarfs, the grey polt, nutmeg grey and early dun, are cultivated for breaking and fattening hogs: as are also many varieties of early and marrowfat peas; and all the different sorts are drilled in rows about a foot and a half apart, from the middle of February to the end of March, or even later. During the summer, the crops are cultivated with horse and hand hoes. The Leadman's dwarfs and the early greys, are thought to be most productive. The early Charleton and hop-spur peas in this country are frequently off the land in sufficient time to have a good crop of turnips.

It is evident from all the experiments which have been made in the culture of this kind of grain, that as large peas, ripen late, and run much to haulm or stalk, they should be sown as early as the climate will permit; for thereby they will get so forward as to have time to put forth and perfect all their blossoms, &c. before a rainy autumn comes, and hurts their farther vegetation. This sort of pea ought to be sown on a white or some mixed land, not very full of juice; but by no means on a cold clay: for the moisture of this last will keep feeding the haulm, and thwart the design of sowing them early. The white or mixed mould must be in good condition, otherwise it cannot maintain a great pea. But a small pea, which ripens early, should be sowed in a strong feeding land, because such land will nourish it more vigorously, without danger of too great an increase of its haulm, which is naturally short; and notwithstanding the coldness of the soil, there is no fear but that it will ripen. Moderate rains are of great service to peas while growing, and particularly at their time of blossoming and filling up the pod; but a continuance of cold rain for some time is perhaps as prejudicial as too much heat or drought. A blueish bloom upon the leaf, and an expansion of the two outermost and largest petals backward, are undoubted signs of great health and vigour.

When peas are reaped, they are generally laid up in small wads, and left in the field till the haulm and pods are dry: but during this time they should be frequently turned, and raised as much as possible from the earth, that they may lie hollow for the wind to dry them, especially when any rain happens to wet and beat them down. In some counties they set their peas abroad in stacks, being persuaded that they thence acquire a much better colour than when housed in a barn.

Beans. The soils on which beans are most successfully cultivated are of the stiff or strong moist kind. They do not thrive very well on warm dry lands. If the inclosures on which they are sown be open, it is also advantageous. They are frequently sown on land which is fresh broken up, being of considerable use in breaking and pulverising the ground, and also in destroying weeds, so that the land is rendered much better for corn, after a crop of beans, than it would have been before, especially if they are sown and managed according to the new husbandry.

The season for sowing beans is from the middle of February to the end of March, according to the nature of the soil; the strongest wet soil should always be last sown. The usual quantity of beans sown to an acre of land is about three bushels, though this is double the quantity that is necessary when the new husbandry is employed.

The common method of sowing is after the plough, in the bottom of the furrows; but in this case the furrows should not be more than five, or at most more than six inches deep. If the land be newly broken up, it is usual to plough it early in the autumn, and to let it lie in ridges till after Christmas, then to plough it in small furrows, and lay the ground very smooth. These two ploughings will break the ground fine enough for beans; and the third ploughing is for sowing the beans, when the furrows are to be made shallow.

In planting beans according to the drill husbandry, the ground should be four times ploughed before they are set, in order to break the clods, and reduce it to a proper state. A drill plough is then to be used, to which a hopper is fixed for setting the beans; the drills should be made at three feet asunder, the spring of the hopper being fixed so as to scatter the beans at three inches distance in them. By this method less than one bushel of seed will plant an acre of land. When the beans are up, if the ground be stirred between the rows with a horse-plough, it will destroy all the young weeds; and when they are advanced about three or four inches high, the ground should be again ploughed between the rows, and the earth laid up to the beans. If a third ploughing about five or six weeks after this be given, the ground will be kept clear from weeds, and the beans will stalk out, and produce a much greater crop than in the common manner.

The sorts cultivated are numerous. In Kent the following are chiefly known: the common ticks, the large flat ticks, or May-beans, small or Essex ticks, and French ticks: and of the garden beans, the Toker, Windsor, long pod, Spanish or Lisbon, and Mazagan. There are also a few other varieties, but which are cultivated only in small quantities. The first is the sort most generally grown by the farmers in that county, and is used for fattening hogs, and as food for horses. They are commonly either drilled, dropped by hand, or boxed, in furrows eighteen inches apart, from three and a half to four bushels per acre, in February and March; and in either case they are mostly hand and horse-hoed twice, and sometimes three times, and finally hand-weeded. The May-beans are a larger sort of ticks, and somewhat earlier ripe: they are sometimes very productive; but, being larger, are in consequence not so heavy, nor so valuable. Sometimes four bushels and sometimes four and a half of this kind of beans are dropped in by hand per acre; but in other respects they are managed in the same way as the common tick beans. The Essex ticks are a much smaller sort than the common tick, and of a rounder shape. They ripen six or eight days later than the first kind, and are not so productive, but more valuable on account of their greater weight. The small French ticks are a still less sort, being about as big as a moderate sized pea, and nearly circular; this is the latest ripening sort known, and most valuable when dry, on account of their great weight. It is said they will grow on some sorts of poor land, not well adapted for the larger

kinds; but they are not very productive. Three bushels per acre of these two small kinds is a sufficient quantity to seed the land when drilled; which is probably the best method of putting them in the ground. The Toker is the largest garden-bean, and somewhat of an oval shape. Several of them are met with of an inch and a half in length. The quantity of seed is commonly about five and a half or six bushels to the acre. The beans are dropped by hand, in rows about twenty inches apart, as soon as the land is sufficiently dry in the spring. They should be kept perfectly free from weeds during the summer, and be pulled up by the hand in harvest. The produce is sometimes very abundant. The Windsor-bean is rather less than the Toker, shorter, and approaches more to a square form. It is managed in the same way as the last kind in every respect, except a little less seed being required.

The long pod is only about half as large as the Toker, but a more early sort. They are commonly dropped by the hand in rows about a foot and a half apart; and the quantity of seed necessary is about four bushels and a half to the acre.

The Spanish or Lisbon is a still smaller bean, but which ripens about the same time. The Mazagan is the smallest of any of the garden beans, but the most early ripe. This sort is frequently drilled in the quantity of four bushels to an acre.

When beans are ripe they are either reaped with a hook, or mown; and after having lain a few days on the ground, are turned several times until they are dry enough to be stacked; but it is a better method to tie them in small bundles, and set them upright.

Beans should lie in the mow to sweat, before they are threshed out; for as the haulm is large and succulent, it is very apt to give and grow moist; but there is no danger of the beans receiving damage, if stacked tolerably dry; because the pods will preserve the beans from injury; and they will be much easier to thresh after they have sweated in the mow than before; and after they have once sweated and are dry again, they never give. The produce by the new husbandry would seem to be much greater than by the old.

Beans form a part of the food of horses, and are chiefly used in mixture with bran or chaff, though by some upon the road with oats. They are however mostly given to coach-horses and such as are constantly in draught. They afford the strongest nourishment of all kinds of grain, and will enable horses to go through a great deal of heavy labour.

Turnips. The bulbs of this kind chiefly cultivated are the round, purple, and green-topped turnip, the yellow turnip, the black-rooted and the early Dutch.

Turnips are most adapted to a light sandy loamy soil that is not very rich, as in a very rich soil they grow rank and are sticky. They will however grow tolerably well on many other kinds of soil.

The general season for sowing is from the beginning of June to the middle of August; it is not advisable to sow them much later; for if the autumn do not prove very mild, they will not have time to apple before winter, nor will the roots of those which are sown after the middle of July grow very large, unless there be not much frost in the autumn. By those who propagate them to supply the markets they are sown successively from March to August. There is, however, great hazard of losing by the fly those which are sown early in the year, when the season proves dry. They should be sown upon an open spot of ground if possible, as they are apt to draw up too much, and be very long topped, without having their roots grow to any size, in close situations.

Land for turnips should be ploughed in April, and twyfallowed in May, that is once more ploughed and twice well harrowed, to make it very fine: the seed should then be sown rather thin. One pound is the common allowance for an acre. The seed should be harrowed in as soon as it is sown, with a short-tined harrow, and the ground rolled with a wooden roller, in order to break the clods and make the surface even. When the plants have got four or five leaves, they must be hoed to destroy the weeds, and cut up the plants where they are too thick, the remaining ones being left about six or eigh inches asunder each way. The sooner this is performed, when the plants have four leaves, the better they will thrive. In the second hoeing, which should be performed about a month after the first, they must be cut up, so as that the remaining plants may stand fourteen or sixteen inches distant, especially if they be designed for feeding cattle. But where they are sown for the use of the kitchen, they need not be left at a greater distance than ten inches or a foot, as large roots are not so much esteemed for the use of the table.

Some farmers sow the seed in rows, with a drill-plough: the rows are from three to six feet asunder. In this way much larger crops have been produced than by the broad-cast method, though the last is more generally practised, and does very well with good hoeing.

Turnips, when sown in drills, require to be hoed by hand, to separate and cut out the plants where they are too near together in the rows; and also to cut up the weeds between the plants where the plough cannot reach them. If this be carefully performed, the ploughing of the intervals will encourage the growth of the roots, by stirring the ground, and render the land much better prepared for the crop of barley, or whatever else is to be sown the following spring. This mode of culture has been supposed by some to be more expensive than that commonly practised; but those who have made trial of both, find the horse-hoeing to be much the cheapest, and by far the best. The most advantageous way of doing this is to plough between every other row, and some time after to plough the alternate intervals; by which method the plants will receive more benefit, from the frequency probably at first only of stirring the ground, than they would do if all the intervals were hoed at one time; and will be in less danger of suffering from the earth being thrown up too high on some rows, while others may be left too bare of earth: but, when the earth has been thrown up on one side of the drill, it may be turned down again soon after the next interval is ploughed. But as the plough cannot be drawn nearer to the drills than two or three inches, the remaining ground should be forked to loosen the parts, and make way for the fibres of the roots to strike out into the intervals: otherwise, if the land be strong, it will become so hard in those places which are not stirred, as to stint the growth of the turnips. This is however the most necessary in stiff strong land. When the ground is stirred in this manner, one ploughing will be suf-

ficient, after the turnips are eaten off, for the sowing of barley or any other crop.

Turnips have also been sowed between drills of wheat with some success: but the practice has not been generally followed.

In the growth of turnips as indeed in all esculents there is a certain period, when they are in the greatest perfection, and most nourishing state for cattle. Those who have occasion to purchase them, observe that an acre of turnips before Christmas will fatten as many sheep as an acre and a half of the same turnips after that time.

It is a custom with some farmers to draw up their turnips late in autumn, and lay them up in store against winter; by which means they are always ready. It is however very difficult, if not impracticable, to preserve them from very severe frosts, unless they have been drawn previous to such frost. This would not answer the farmer's purpose, as the trouble and expence of housing or stacking them would far exceed the advantage, even in a hard season, and in mild winters would be entirely thrown away. To preserve them for late spring-feed however is a task of the greatest difficulty. Various methods have been tried; and among the rest, that of drawing and burying them in sand: but this has not answered, on account of the juicy quality of the turnip and the hot nature of the sand which quickly promotes the germination; after the termination of which they speedily putrefy, and become quite unfit for food.

Probably the best mode of preserving them is to stack them up in dry straw; a load of which is sufficient to preserve forty tons of turnips. The method is this: after drawing the turnips in February, cut off the tops and tap-roots, and let them lie a few days in the field, as no weather will at that time hurt them. Then, on a layer of straw next the ground place a layer of turnips two feet thick; and afterwards another layer of straw, and so on alternately, till the heap be brought to a point. Care is to be taken that the edges of the layers of straw be turned up, to prevent the turnips from rolling out; and the top is to be well covered with long straw, as a thatch. In this way as the straw imbibes the moisture exhaled from the roots, all germination is prevented, and the turnips are nearly as good in May as when first drawn from the field. Old haulm or stubble will answer the purpose where straw is not easy to be had.

However, in order to prevent this trouble and expence, the method used by the Norfolk farmers may perhaps be advantageously followed; which is, to continue sowing turnips to the latter end of August; by which means their late crops remain good in the field till the latter end of April, and often till the middle of May. But in whatever way accomplished, the advantages of having turnips good till the spring-feed is generally ready, are extremely obvious and important.

The principal use of turnips is in feeding cattle in the winter and spring, when there is a want of grass for their pasture. Oxen and hogs are particularly fond of this food, which is very fattening to them; and when given to cows their milk is much increased by it. Sheep also eat it readily, and thrive upon it, when they have been used to it early; but they do not relish it when it has not been offered them till they are grown old: however, if kept fasting two or three days, most of them take to it; and when they have once tasted it, they become very fond of, and feed kindly upon it. In some places, farmers feed their lambs with turnips till the middle of April, when they begin to seed. This is done to preserve their clover, sainfoin, lucern, &c. The practice of turning a flock of sheep at random into a large field of turnips is very improper; for they will spoil more in a fortnight than would keep them the whole winter.

The *Ruta-baga*, or Sweedish turnip, thrives well in many parts. It is the hardiest of all the kinds, but less productive than many. It grows best in the north, and is chiefly of use in standing the frost with little or no injury.

Besides frost, turnips derive much injury from the fly, and from caterpillars. For the first Mr. Kent recommends ploughing the land till it is very fine, and filling it full of muck. Ducks however eat them voraciously, as poultry in general do the caterpillars; and hence these should be freely turned into the field in the morning.

Potatoes. The soil in which these thrive best, is a light sandy loam, neither too dry nor over moist, but brought to a fine tilth, and ploughed very deep, for the deeper the earth is loosened, the finer and larger the bulbs will grow. Four eyes of the cluster sort of potatoes being planted by Mr. Townley on four different kinds of soil, produced as follows. In

1.	A strong rich loam,	34 lb.
2.	A light rich loam,	29
3.	A good gravel,	19
4.	A sandy soil,	15

It seems therefore well ascertained, that dry soils are to be preferred for potatoes: though an old sward or fresh lay is preferred in many places as a preparation, and is said frequently to produce large crops without any manure being applied. In Suffolk, an old layer produced 400 bushels without manure: and in Cheshire, old grass dug, 500 bushels per acre. The culture of potatoes is also highly advantageous for improving waste and mossy soils; and large crops are frequently produced on these kinds of land, particularly the latter, when made dry by draining.

No vegetables seem to derive so much benefit from rich ammoniacal manure as potatoes. Various kinds have, in consequence, been employed: wood-ashes, powdered bones, soot, lime, coal-ashes, common dung, and night-soil. Of these the two last have uniformly answered best, as will evidently appear from the following table published by Mr. Young, as the result of his own observations, which upon comparison we find not essentially to differ from the best tables of other agriculturists:

			Bush.	*Second Year.*
No. 1.	No manure, produced		120	per acre 140
2.	Night soil	10 wag. loads	600	640
3.	Ditto	6 ditto	650	500
4.	Ditto	2 ditto	500	300
5.	Bones	10 ditto	650	640
6.	Ditto	6 ditto	640	560
7.	Ditto	2 ditto	560	240
8.	Hog dung	60 one-horse cart loads	480	300
9.	Ditto	30 ditto	480	160
10.	Yard compost	60 ditto	300	240
11.	Ditto	120 ditto	480	300
12.	Ditto	30 ditto	140	140

The different sorts of potatoes planted, are almost innumerable. For cattle the kinds chiefly cultivated are the *ox noble* and the *cluster*. The

old winter red is peculiarly good in the spring when others have lost their flavour, and is seldom affected by the curl. In Yorkshire the sorts chiefly cultivated are the *ox noble*, *champion*, and *Surinam* but especially the *kidney*, which is also principally grown in the Isle of Man. It is however less prolific than many, and does not keep well.

The white and apple sorts are better than most others for the first part of the season: the pink eyes and copperplates are hardy, strong, and admit of coarse management; the blacks a late sort, also keep well till August, or thereabouts.

On comparing the cluster, Red-nosed kidney, and golden tags, Mr. Young found the produce per acre, under the same management in the drill method, to be as follows:

Cluster	360 bushels
Kidney	144
Tags	207

Mr. Hassal observes, that the kinds of potatoe, which he has found most useful for family consumption, are the apple and the white kidney, which are cultivated with great success in the counties of Wexford and Wicklow, in Ireland. These sorts produce great returns, are firm and mealy, pleasant to the palate, and do not acquire that disagreeable taste at the approach of summer, to which many other sorts are subject; and the royal, or Cumberland early, is of a large size, very prolific, of an excellent flavour, and ripens early enough to admit of the ground being employed either in raising another crop of the same potatoes, or a crop of white peas, turnips, cabbages, &c. These circumstances render it very valuable; but what gives it a decided preference is, that it is ready at a time when the price of grain and other necessaries is at the highest, which is between the old and the new crops.

It is generally recommended, that in the spring, just before the last ploughing, a good quantity of rotten dung should be spread on the ground intended for potatoes, and that this should be ploughed in early in March, if the season be mild: otherwise it had better be deferred until the middle or latter end of that month: for, if a hard frost should come on soon after the roots are planted, they may be greatly injured, if not destroyed thereby; but if they can be planted in the spring, without that danger, it is so much the better. The last ploughing should lay the ground even, and then furrows should be drawn three feet asunder, and seven or eight inches deep. The roots should be laid at the bottom of these furrows, about a foot asunder, and then be covered in with earth.

The rows of potatoes are placed at three feet distance, in order to introduce the hoe-plough between them, as it greatly improves their roots: for by twice stirring and breaking of the ground between these plants, not only weeds will be destroyed, but the soil will be so loosened, that every shower of rain will penetrate to the roots, and quicken their growth. These operations should be performed early in the season, before the stems or branches of the plants begin to fall and spread upon the ground; as it cannot be done afterwards without hurting the shoots. But as the horse-hoe can only go between the rows, it will be necessary to make use of a hand-hoe to stir the ground, and destroy the weeds in the rows, between the plants. If this is well done in dry weather, immediately after each of the two horse-hoeings, it will be sufficient to keep the ground clean until the potatoes are fit to be taken up; which will be soon after the first frost in the autumn has killed the haulm.

The Curl. This is a disease to which potatoes are excessively subject, but the cause of which has never been fully explained. It is of more consequence, however, to know the means of preventing it: and this is by continually changing the soil or the sort, and thus by never setting from the same potatoes two years successively: by obtaining annually seeds raised at some distance from the ground about to be planted, and from a soil of a different kind.

Preserving Potatoes. Having lain after they are gathered upon a barn floor, or under cover, a sufficient time to dry on the surface, they are to be deposited in the earth to secure them from rain or frost; to either of which if much exposed, they will soon rot and become unfit for any purpose. In order to make these storehouses of safety, a hole is to be dug in the earth; whose whole extent is to be an equal depth, and the dimensions of which are to be regulated by the quantity of potatoes to be deposited. The store is to be laid in this hole prepared for its reception; and when the first made hollow of this receptacle is filled to the brim, sods are to be dug from the sides of it, and placed firm in their situation round the edge of the hole: this will form a second cavity to be filled; and as you thus advance in height above the level of the surface of the ground, straw is to be placed on the sides betwixt the earth and the potatoes: thus you are to proceed, gradually diminishing the circumference of your heap, until it ends in a point, in form resembling a rick of corn. The earth which covers this must be of a considerable thickness, and is to be beaten firmly together with a spade, so that no crevices may be left through which rain, snow or frost can penetrate. On the summit of this heap it is common to place one large green sod. As it will take a considerable quantity of earth to cover this deposit, so as to secure its contents from long and intense frost, the surrounding surface of the ground being dug up for this use, will be very conveniently lower than the bottom of the hole, and thus prevent water from settling in that part; as in such case it might run in among and injure the potatoes. If, during the winter, frost of unusual severity and continuance should happen, it will be proper to cover the potatoe-hole with some strawy dung, in order more effectually to secure its contents.

Of all the methods of preparing this root for food boiling is the most common; and though instruction on this head may by many persons be deemed superfluous, the appearance and flavour of the potatoe very much depend upon skill and care in this part of cookery. On this subject the following directions are given by Mr. Kirkpatrick: never pare the potatoe like an apple, but scrape off the outer skin with a knife—do not let them boil hastily, nay hardly boil at all, but simmer: when they begin to soften watch them attentively, feel them with a fork, and as soon as they are easily perforated immediately pour off the water; throw some salt upon them, set them again over the fire in the same vessel, until every particle of remaining moisture is exhausted, and bring them as hot as possible to the table.

Of Carrots. The soil most proper for the cultivation of this useful root is a sandy loam; but they may be raised on many other kinds of soil, when rendered fine and mellow by proper plough-

ing and harrowing. These are sown after turnips, summer-land barley, and peas set upon a rye-grass lay; the crop upon the first is generally the most productive. In the first place feed off the turnips by the beginning of February, and then lay the land up on small balks or furrows, in which state it should remain until the second week in March, when it is to be harrowed down, double-furrowed to the depth of about twelve inches, and the seed sown thereon, at the rate of four pounds and a half to the acre. As soon as the plants appear distinctly, set them out with a small hoe, at the distance of six inches from each other; they are afterwards to be hoed twice more at different times, according as the crop seems to require it; and it is not unusual to harrow them between the hoeings, which does no injury to the root, and frequently saves the expence of a third hoeing.

When carrots are intended to be sown after peas, plough the stubble as soon as the harvest is over, in order that the land may clear itself of weeds; in December let it be laid up in small balks to receive the benefit of the frosts; in February harrow it down, and manure it at the rate of fifteen loads per acre; the manure is to be ploughed in to the depth of about four inches, and in the middle of March the land is to be double-furrowed, and the seed sown. By pursuing this method, the manure lies in the centre of the soil, and not only affords nourishment and support to the carrot in its perpendicular progress, but renders it easy to be turned up by a single ploughing, and greatly promotes the growth of the succeeding crop of barley.

When the crop of carrots is very clean, one hoeing may be sufficient; but where the weeds are strong it is necessary to hoe them a second time; but about ten days or a fortnight after the first hoeing, they should be harrowed: this will displace the weeds, and prevent their growing again, which many of them will otherwise probably do, especially if it be showery weather: the harrowing does not hurt the carrot plants, but, on the contrary, does them service, by bringing fresh earth to them, as well as by destroying the weeds. About three weeks after harrowing, in case it has not perfectly cleared the ground of weeds, or in case new weeds spring up, many hoe the carrots a second time; and after this, if there still remain any weeds, which will be the case if much rain fall during the time of the second hoeing, a second harrowing is bestowed. But where the weather has been favourable, and those employed in hoeing have done their duty, the carrots once hoed and harrowed are as clean as those on which two hoeings and as many harrowings have been practised.

Carrots are a very useful and nutritive food for most cattle. At the lowest calculation, from our own trials, they exceed turnips in value one-third, as to quantity of seed, but are far superior in what arises from convenience. For the stable, they seem to be a perfect substitute of corn for all horses, at least for those not used in any quick work; and partially so, for those that are, when corn is joined with them. If they be given when perfectly dry, no washing of the carrots is, in general, necessary for any cattle, except for horses regularly kept in the stable.

In Suffolk, after the carrots are taken up, they are laid in an outhouse and covered well with straw, to guard them against the frost; though it is not unusual for some farmers to let them continue in the ground until they are wanted, which is less expensive; and the weather must be extremely severe to injure the crown of the root, which is more hardy than either a turnip or potatoe. When they are pulled up, care must be taken of the tops, which are equally good with the roots for cows, sheep, and hogs.

Parsneps. These roots require a rich, mellow, and deep soil, in order that they may have full room to thicken and run downward. The seeds of these plants should be sown in February or March, either alone or with carrots, especially if it be intended to draw these last very young; because parsneps seldom spread much before the latter end of summer, by which time the carrots will, in this case, be gone.

It is necessary that the young parsneps be hoed and weeded, or, if they be sown in rows, that the ground between the rows be dug three or four times in the spring, or whenever weeds appear.

When the leaves of this plant begin to decay, the roots may be dug up for use: but they are seldom well tasted before that time; nor are they good late in the spring, after they have shot out again. In order to preserve them for spring use, they should be dug up in the beginning of February, and buried in sand in a dry place, where they will keep good until the middle of April, or even to a later period.

Cabbages. These grow extremely well on any loamy soil which is in good heart and made sufficiently fine. For this last purpose the land should be thrown up in the autumn, that it may enjoy all the advantages of a winter and summer fallow; and as these plants extract their nourishment from a considerable depth, as well as from the surface of the soil, it will also be necessary that it should be double trenched during the time of fallowing. Immediately after harvest, it is to be turned up, and the workman is to go as deep as he can with his plough: another plough is to follow immediately in the same furrow with a higher earth-board, which will cast the mould over, and bury the stubble, if not destroyed before by some other method. In this manner the field will, as it were, be turned upside down, double spitted more than a foot deep, and the stubble be sooner rotted. The harrows must then make the ground as fine as the season will admit. After this, when the weather will allow, double trench the land, and lay it up till the spring in sharp ridges. By these means the ground is rendered extremely mellow, but the process is probably too expensive for general practice. The land being thus properly prepared, the plants are generally set in rows at the distance of about two feet and a half, or three feet, and two feet asunder.

Mr. Boys observes, that the tillage necessary for cabbage in Kent, is to plough the land in the winter six or seven inches deep, and to cross plough it in the spring in a dry season; and then, after manuring with a good covering of rotten dung, before planting in June, to plough it again, turning over a furrow ten inches wide; and then, by planting every third furrow, the rows of cabbages will stand two feet and a half apart. The sort for cattle or sheep is the large drum-head, which in good land will grow to an immense size. The seed should be sown the last week in March, on a rich warm border of light

soil, where the plants may remain till a showery season in June, when they should be transplanted with small iron trowels, in the following method:—The plants being ready drawn from the seed-bed, a woman attends in the field to dip the roots of the plants in fine mould and water, beat together to the consistence of batter; two others then carry them in handfuls and strew them in small lumps along the furrows ready for the planters; seven men will keep these three women fully employed: they thrust their trowels with their right hand into the land, in a diagonal direction, with the point towards them; and then, by pulling the handle of the trowel a little towards them, the earth is lifted so as to leave a space to put in the plant with the left hand; the trowel is immediately drawn out, and the earth pressed close to the root of the plant with the handle. The land being ploughed straight, and left unharrowed, there is no occasion for lines to direct the planter. By rolling the surface, after the plants are in, the work is finished. In July and August the crop must be kept clean by horse and hand-hoeing.

Mr. Baker, who has made many experiments on different kinds of cabbages, and detailed them in the Transactions of the Dublin Society, distinguishes them into summer and winter sorts. The summer cabbages are those raised from seed sown in March, and the winter those from seed sown in August. The drum-head, or great Scotch cabbage, is probably the most productive and hardy of any of the winter sorts.

It is now fully proved by experience, that cabbages are not only very agreeable food for cattle and sheep, but that they are also very nourishing to them. Cows fed upon cabbages give a great deal of milk, but the butter made from it has been objected to. It is now however known, that the bad taste of butter, when cows feed upon cabbages, is owing to their eating the decayed leaves: for when these decayed leaves are taken off, and only the sound cabbages given to the cows, the milk and butter are perfectly sweet, and of a rich taste. The quantity of food cabbages produce is very great; being from twenty or thirty to fifty ton and upwards per acre: some of them continue sound through the winter, and even during the months of March, April, and May; which renders them peculiarly valuable; for in these last months the winter provision for cattle is mostly spent, and the grass is seldom advanced so far as to supply them.

Turnip Cabbage. The mode of culture of this plant is pretty similar to that of the common cabbage: but the earlier the seed is sown in the spring, and consequently the earlier the plants are put out the better, especially in poor ground. In strong land, and a favourable season, a good crop may be procured by sowing the first or second week in May. If sown ever so early, they never run to seed the first summer, unless here and there one which has deviated from its sort. In good ground the rows may be from three to five feet asunder, and the plants not less than three feet in the rows. Great care must be taken not to plant them too deep; and, when hoed, not to draw the mould too high in their stalks. Strict attention must also be paid in selecting the bulbs for seed, which should always be the cleanest and handsomest: otherwise they are very apt to sport, as it is termed, or run from their kind. The bulbs will be fit for use by October, and may be used till they begin to sprout in the spring, at which time the young shoots are very delicate eating. In preparing for the table, the rind, which is very tough and fibrous, must be entirely taken off, and the bulb cut into small pieces, and treated as turnips: they will require to be boiled at least two, and sometimes three hours, before they will be sufficiently tender.

These plants possess some advantages over the common turnip. They have a strong power of resisting putrefaction, and of course endure the frost and wet, but particularly the latter, better than most plants. They are much more nutritive than the common turnip; and being of a closer texture, and less watery, contain more food in a given space. By standing up above the ground on a foot-stalk, they are more readily come at, when the ground is covered with snow. If the ground be in good proof, and they be intended for spring feed, it will be time enough to plant them out the beginning, or even the middle of July; which will give the farmer a long summer to clean his ground. They may be reserved almost as late in the spring as you please: for the bulbs will be found nearly as firm and sweet, after the seed has been cut, as before. Their leaves, not being bitter like those of the turnip, are more readily eaten by cattle.

Rape, Cole, or *Navew.* This is also a species of cabbage, being the *Brassica Napus*, of the sexual system. The plant is cultivated both for its seed and for the feeding of cattle. Rape will grow well on almost any soil, but succeeds best on those that are deep, with a clayey bottom, and on which manuring and deep ploughing have been practised.

In Essex they generally plough up the fallow early in the spring, and let it lie till the latter end of March; they then plough it again, after which they harrow it down, and lay on a coat of manure. After this is spread, they cross-plough it again in May, and get it in fine tilth by the end of June or thereabouts. In ploughing for the sowing of rape, the plough should go north and south, if the field will admit of it; as in that case the land when sown will lie full faced to the sun. About the first of July, or the first rain after that time, they sow the seed in the proportion of about half a peck to an acre. It is scattered with three fingers broadcast, and the land lightly harrowed and rolled. In September they hoe it in the same manner as turnips, setting the plants out at about a foot distance, and clear out the weeds. This hoeing is done at the expense of about three shillings an acre, renders the plants much stronger than they otherwise would be, and makes them produce more seed. If any part of the field miss, they fill it up with plants from the thicker parts in the latter end of October, or beginning of November, which answers much better than transplanting them in January; for in the latter case, should a sharp frost suuceed, they would be mostly killed from not being rooted; otherwise the severest frost in this climate does not hurt them.

In other places, the time of sowing rape broadcast is the latter end of May or beginning of June; the land, previous to sowing, being twice ploughed and well pulverized. About two pounds of clean seed is sufficient for every acre, which should be cast upon the ground as equally as possible. When the plants come up too thick, a pair of light harrows are sometimes drawn

length-ways and cross-ways over the land: this thins them equally; and when the plants thus pulled up are withered, the ground is rolled, and a few days after the plants are set out with a hoe, at the distance of 16 or 18 inches.

In some parts of the north of England, the farmers pare and burn pasture lands, and sow them with rape after one ploughing, and by this means have a good crop.

2. Of grasses, properly, and improperly so called; Hemp; Flax; and Hops.

PROPER GRASSES.

If we examine our meadows, pastures, and downs, we shall find all of them except those which have of late years been sown with ray-grass and clover, full of an indiscriminate mixture of plants, some of which afford good, others bad food for cattle; some rich crops, others scarcely any crops at all. Mr. T. White, had the curiosity to investigate with some accuracy the various plants that are found in a state of nature on several of our commons in Hampshire and Sussex; and in various pieces of turf, each not more than six inches in diameter and chosen indiscriminately, he found according to Mr. Curtis, sometimes three distinct genera of grass, sometimes five, sometimes eight, and sometimes not less than fourteen. In the proverbially productive meadows near Salisbury, Wilts, the chief genera are the *rough-stalked meadow-grass*, (Poa Rivialis) and the *marsh bent-grass*, (Agrostis palustris); but as various concomitant circumstances contribute to the fertily of these meadows, it would perhaps be unfair to other native grasses, to regard these as intrinsically the most productive of any.

The *proper grasses* indigenous to our own country are the following, each of which has several distinct species, besides varieties: and some of them not less than seventeen or eighteen species.

1. Agrostis. Bent-grass, eleven species.
2. Aira. Hair-grass, seven species.
3. Alopecurus. Fox-tail-grass, five species.
4. Anthoxanthum. Vernal or spring-grass one species only; odoratum, sweet-scented.
5. Arundo. Reed-grass, four species.
6. Avena. Oat-grass, six species.
7. Briza. Quaking-grass, two species.
8. Bromus. Brome-grass, twelve species.
9. Cynosurus. Dog's-tail-grass, three species.
10. Dactylis. Cock's-foot-grass, two species.
11. Elymus. Lyme-grass, three species.
12. Festuca. Fescue-grass, eighteen species.
13. Hordeum. Barley-grass, four species.
14. Holeus. Soft-grass, two species.
15. Lolium. Darnel-grass, three species.
16. Melica. Melic-grass, three species.
17. Milium. Millet-grass, two species.
18. Nardus. Mat-grass, one species.
19. Panicum. Panic-grass, five species.
20. Poa. Meadow-grass, seventeen species.
21. Phleum. Cat's-tail-grass, five species.
22. Phalaris. Canary-grass, three species.
23. Rotboellia. Hard-grass, one species.
24. Stipa. Feather-grass, one species.
25. Triticum. Wheat-grass, two species.

All these afford more or less nutriment: but the following are those which afford it in the greatest quantity, and are hence chiefly cultivated, or at least chiefly worth cultivating.

1. Anthroxanthum odoratum sweet-scented spring, or vernal grass. For the generic character of which see AUTHROXANTHUM.

3. Alopecurus Pratensis. Meadow Fox-tail grass. See the article ALOPECURUS.

20. Poa Pratensis Smooth-stalke dmeadow grass See POA.

20. Poa Trivialis. Rough-stalked meadow-grass. See POA.

12. Festuca Pratensis. Meadow Fescue-grass. See FESTUCA.

9. Cynosurus Cristatus. Dog's tail crested grass. See CYNOSURUS.

Of these six grasses it appears by accurate and repeated observation.

1. That meadow *Fox-tail*, and *Rough-stalked meadow grass*, are fittest for moist land.

2. That *meadow Fescue*, or *sweet-scented Vernal* is fittest for land either moist or moderately dry.

3. That *Smooth-stalked meadow-grass*, and *Crested Dog's-tail* are fittest for dry pastures.

In the more Southern parts of this kingdom, observes Mr. Curtis, who has studied the nature of grasses more accurately than any botanist whatever, we may in vain expect to cloth dry soils with the constant verdure of grasses: they will not stand the draught of hot parching summers. In such seasons it is only plants which send down roots to a great depth that can be expected to look green or be productive, as Lotus corniculatus, Medicago falcata, &c. of the above six the following is the order of their flowering.

1. Sweet-scented Vernal.
2. Meadow Fox-tail.
3. Smooth-stalked Meadow.
4. Rough-stalked Meadow.
5. Meadow Fescue.
6. Crested Dog's-tail.

We could easily add many more grasses to this list, and those, too, which perhaps might be highly deserving of it: but we have our doubts whether, by recommending more, we might not increase the difficulty of multiplying grass-seeds without any adequate advantage.

We shall, however, just take the liberty of making a few practical remarks on such others of the English grasses, as from long cultivation and observation, appear to us deserving of particular notice.

Agrostis capillaris. Fine Bent-grass. A very common grass on all dry heaths, in pastures, and by road sides, distinguished by its very finely divaricated panicle. A principal, and to us an insuperable objection to this tribe of plants, is the lateness of their flowering, scarcely any of them coming into bloom till July; if any of them deserve culture, it is this species, as it is one of the earliest, and has fine and productive foliage.

This is the grass which, in many parts of the kingdom, forms the turf of our extensive pastures, downs, and sheep walks; we have frequently observed whole acres covered nearly with it alone. For grass plats and lawns, it seems likely to be the best of all our English species, being of ready growth, bearing the scythe well, producing fine foliage, and resisting drought better than most; the foliage of Agrostis fasicularis is still finer, and would probably succeed better, for the same purposes, in moist soils.

Agrostis palustris. Marsh Bent-grass. As the Agrostis capillaris is very common in dry pastures, this abounds in wet meadows and marshes, where it frequently grows to a great

height; its foliage, like that of the other, is fine, but it is liable to the same objection of lateness of flowering.

Aira aquatica, Water Hair-grass. This, in point of sweetness, is superior to all our other British grasses, and equal to any foreign one we are acquainted with, but not cultivatable, as it is entirely an aquatic.

Alopecurus geniculatus, Flote Fox tail grass. Like the Festuca fluitans, agreeable to cattle, and productive, but affects situations too wet, in our opinion, for meadows.

Avena elatior, Tall Oat-grass. Is more frequently found on the confines of meadows, in hedge rows, and hedges, than in meadows themselves, in which, however, it is sometimes found abundantly; it is early, very productive, and produces a very plentiful aftermath; in excellence it comes near to the Alopecurus pratensis, for which it may prove no bad substitute. Is cultivated abroad, vid. Annals of Agricult. v. xii. p. 441. There is a variety of it with knobby roots, a troublesome weed in corn fields in some parts of the kingdom.

Avena flavescens, Yellow Oat-grass, affects dry soils, is rather early, and tolerably productive; bids fair to make good sheep pasture.

Avena pubescens, Rough Oat-grass. Is tolerably early, hardy, productive, and of good verdure, but its foliage is uncommonly bitter.

Briza media, Common Quaking-grass, affects chalky soils, but is not confined to them; is moderately productive, and likely to form good sheep pasture.

Bromus mollis. Soft Brome-grass. What shall we say of this grass? concerning which such various opinions are entertained; a grass which predominates in most of our meadows about London, in the spring, and which, if it were cut on its first coming into ear, would form the principal crop, and might, probably, make no bad hay; but, as, at this period, the general herbage is not considered as sufficiently forward, it is suffered to ripen, and shed its seeds, before the meadow or pasture is mown, and thus is lost, or becomes of little value; in such meadows and pastures it is yearly renewed by its seed, for it is an undoubted annual. As an early grass, it might probably be cultivated to advantage, in the manner of rye; at present we cannot but consider it as a weed, usurping the place, and hindering the growth, of better herbage.

Bromus erectus, Upright Brome grass, grows wild in chalky pastures, to which, as far as we have observed, it is altogether confined, and constitutes a considerable part of the grassy herbage; we have been induced to think less favourably of it, from seeing it grow wild, than when cultivated in a garden; it is, however, deserving of trial, especially as it is early.

Cynosurus cœruleus, Blue Dog's tail grass, earliest of all the British grasses, flowering a fortnight sooner than the sweet scented Vernal, grows naturally on the tops of the highest limestone rocks in the Northern parts of Great Britain; not very productive, especially as a grass for sheep, bears the drought of summer remarkably well.

Dactylis glomeratus, Rough Cock's foot grass, a rough coarse grass, but extremely hardy and productive, common in orchards and meadows, and rather early.

Festuca ovina. Sheeps Fescue grass. From observations made on this grass, where it has grown wild, and from cultivating it in a moist soil, the reverse of its natural one, we are induced to think differently of it from most writers. Linneus, if we are not mistaken, was the first who considered it in a favourable point of view: in his Flora Suecica, he thus speaks of it: This grass is a principal food of sheep, who have no relish for such hills and heaths as are without it; hence he calls it ovina. Gmelin Fl. Sibir. says, "That the Tartars choose to fix during the summer in those places where there is the greatest plenty of this grass, because it affords a most wholesome nourishment to all kinds of cattle, but chiefly sheep."

It is possible, that, in the more elevated parts of Northern Europe, this grass may differ somewhat in its appearance and produce, from what it does with us: in the environs of London it grows spontaneously, on dry elevated heaths and commons; in such situations its produce is extremely trifling, its foliage hard and wiry, and its appearance, in dry summers, unpleasantly brown. In a rich moist soil the foliage retains its verdure, and becomes much longer, but still, being in its nature a small plant, it cannot be productive—consequently has no pretensions to be considered as fit for a hay grass; it is, in fact, to the Alopecurus pratensis, what the Daisy is to the Cichorium Intybus. In the cultivation of plants it is well to bear the old maxim in mind, nature will prevail. If we force a plant on a soil or situation foreign to that in which it is constantly found, we deceive ourselves; were the Festuca ovina to be sown in a rich moist soil, the grasses, and other plants, natural to such a soil and situation, would quickly overpower it, and, in the space of a year or two, scarcely a blade of it would be discernable: or were we for the sake of our sheep (taking it for granted that they are commonly attached to it, the reverse of which we have heard asserted by men of observation), to plough up our elevated heaths and downs, and sow them with this grass, the sheep would starve on them in dry summers. Where then is the boasted value of this grass? Mr. Anderson it is true, has bestowed ten pages on its merits; but he surely errs (humanum est errare), when, after describing its leaves as little bigger than horse hairs, or swine's bristles, and seldom exceeding six or seven inches in length, he says, "That it is capable of affording an immense quantity of hay, promises to be one of the most valuable grasses our country produces, and to make a most valuable acquisition to the farmer." It appears to us applicable only to the purpose of making a fine leaved grass plat, that shall require little or no mowing. For this purpose it must be sown about the middle of August, in an open, not too dry situation, broadcast, and that thickly, on ground very nicely prepared and levelled; when it has once got possession of the soil, it will form so thick a turf, as to suffer few intruding weeds, and may be kept in order with little trouble.

Festuca duriuscula, Hard Fescue grass, affects such situations as the smooth stalked meadow grass, and sheeps Fescue, all three being not unfrequently found on walls; it is common also in our downs, and in our meadows and pastures; according to situation, it varies much in size and breadth of leaf, as well as colour of its panicle, but in all situations is very distinct from the ovina. It is early and productive, its foliage is fine, and of a beautiful green; hence

we have thought it was of all grasses the fittest for a grass plat, or bowling green: but we have found, that though it thrives very much, when first sown or planted, it is apt to become thin, and almost disappear, after a while; from its natural place of growth, it appears to be a proper grass to unite with those intended for sheep pasture.

Festuca elatior. Tall Fescue grass, very similar to the Festuca pratensis, yet specifically different; found naturally in marshes, in which it grows to a great height; is hardy, and very productive, but, we apprehend, too harsh and course for hay, yet may, perhaps, be a good grass for soils, which cannot be drained of their too great moisture, are overrun with meadow sweet, and such like weeds, or which are apt to be overflown.

The seeds of this plant, when cultivated, are not fertile, hence it can only be introduced by parting its roots, and planting them out; in this there would be no great difficulty, provided it were likely to answer the expense, which we are strongly of opinion it would, in certain cases; indeed we have often thought that meadows would be best formed by planting out the roots of grasses, and other plants, in a regular manner; and, however singular such a practice may appear at present, it will probably be adopted at some future period: this great advantage would attend it, noxious weeds might more easily be kept down, until the grasses, and other plants had established themselves

Festuca soliaccea. Darnel Fescue grass, found sparingly in good meadows near London, extremely similar to Solium perenne in appearance, but taller and more productive; its foliage is harsh, and, like the Solium perenne, it runs too much to stalk: it is undoubtedly a distinct species, very hardy, tolerably early, of very rapid increase, yet not by creeping roots; more deserving of trial than many which have been pompously recommended.

The seeds of this grass being in the same predicament as those of Festuca elatior, the plant can only be propagated in the same way.—A more particular account of Festuca loliacea, elatior, and pratensis, may be seen in the Flor. Lond. fasc. 6.

Festuca Cambrica. Welch Fescue grass, somewhat like the Festuca duriuscula in appearance and qualities. Mr. Curtis never could obtain any perfect seed from it at his gardens, Lambeth Marsh, or Brompton.

Festuca fluitans. Flote Fescue grass, Vid. Alopecurus Geniculatus.

Hordeum murinum, Wall Barley grass. Squirrel Tail grass. Common at the foot of walls, and by the sides of paths, seldom seen in meadows and pastures; yet, in some parts of the kingdom, is found amongst the hay, in sufficient quantity to prove highly injurious to horses—the awns, or beards of the ears, sticking into their mouths, and making them so sore that they are unable to eat—ought therefore to be known, that it may be avoided.

Our information respecting the Squirrel Tail grass, though from highly respectable authority, we have some reason to think may be incorrect as to the species; shall leave it to some botanist who may visit the Isle of Thanet, to determine, whether it be the Hordeum murinum, pratense, or maritimum.

Hordeum vratense Meadow Barley grass, a taller and more delicate grass than the preceding, found generally in good meadows, and sometimes forming a great part of the crop; yet, as it is neither so early, nor so productive, as many others, and may possibly have the same bad quality as the foregoing, must be cautiously introduced.

Holcus lanatus. Meadow Soft grass, a very common grass in all meadows and pastures; also in waste ground, and woods newly cut down; is hardy and productive of foliage, flowers a month later than the Anthoxanthum, when its red panicle appears, the farmers consider their grass fit for mowing. Its foliage is soft and woolly; if not disliked by cattle, on that account, may rank with some of the best grasses; if more early, would be more valuable.

Holcus mollis. Creeping Soft grass. We are induced to think better of this grass, than when it was first figured and described in the 54th. No. of the Flora Londinensis, having found that it will grow well in a sandy soil, and bear the drought of summer better than most others. Captain Dorset is of opinion, that it may be even cultivated advantageously in barren sandy soils.

Lolium perenne, Ray or Rye grass. Though the Lolium perenne may not possess all that is desirable in a grass, it is not therefore to be considered as of no value, and indiscriminately rejected. The complaint so generally urged against it, of its producing little more than stalks or bents, will be only found valid when the plant grows in upland pasture and dry situations: in rich moist meadows its foliage is more abundant, and it seems to be the general opinion of agriculturists, that it is highly acceptable and nutritious to cattle. As its foliage is of rapid growth, and its flowering stems are continually shooting forth, it should never be sown to form a lawn, grass plat, or bowling green.

The produce of some turfs sent us by Mr. Loveden, and cut out of his best meadows, consisted chiefly of Lolium perenne: much yet remains to be known of this most common grass, which appears to vary, ad infinitum, even in its wild state; we have seen a variety of it with double flowers, and one with awns, both of which are very uncommon: the spike, where the plant grows luxuriantly, is sometimes found branched; seeds of this variety do not constantly produce the same: the battle-door variety is very common; in some pastures, and such as were not very moist, we have seen its stalks viviparous towards autumn; in some situations again we have seen it produce foliage chiefly, in others little besides flowering stems, and to prove almost annual. As we have, in many instances, improved varieties of plants, for agricultural, and other purposes, so we think it highly probable that such might be obtained from this grass.

Poa aquatica. Water, or Reed meadow grass, like the Flote Fescue, is properly an aquatic, growing naturally in standing waters, or land that is periodically overflown; in flat countries, which do not admit of being sufficiently drained, it is almost the only grass for hay and pasturage.

Poa annua. Dwarf meadow grass, a grass common to every quarter of the globe; when cold does not prevent it, perpetually flowering and seeding, and that most rapidly; growing in almost any soil and situation, varying in size,

but never acquiring any great height; its foliage tender and grateful to cattle, but liable to be killed by winter frost, and summer's drought; the first to cover earth made bare, from any cause, hence frequent on the edges of paths, where its seeds being scattered, quickly vegetate, and where it is not overpowered by more luxuriant herbage; not flourishing from being trodden on, as Mr. Stillingfleet has supposed.

Phalaris arundinacea. Reed Canary grass. The foliage of this grass is course, but very productive, and there is a sweetness in it which inclines one to think that it would be very grateful to cattle; where crop, or great quantity of fodder is the object, we would recommend the planting this grass, with Festuca elatior, in wet meadow ground.

Phleum pratense, Meadow Cat's Tail grass. Affects wet situations, is very productive, but coarse and late; has no excellence, that we are acquainted with, which the Alopecurus pratensis does not possess in an equal degree.

Triticum Repens. Creeping Wheat grass, or Couch grass, well known to farmers and gardeners as a most troublesome weed; how far its early foliage may recommend it for pasturage, we shall not presume to determine.

Grasses, improperly so called.

The plants we have just noticed are true and genuine grasses, and all of them belong to some order in the triandric class of the sexual system. There are other iudigenous plants, however, cultivated for the same purpose, and which hence are called grasses, though improperly, as belonging neither to the same sexual class or natural order. The following are the chief:

1. Trifolium pratense. Red clover.
2. ——— repens. White or Dutch clover.
3. ——— procumbens. Hop clover.
4. ——— officinale. Common trefoil (See Trifolium).
5. Hedysarum Onobrychis. Sainfoin (See Hedysarum).
6. Medicago sativa. Lucern. (See Medicago).
7. Poterium Sanguisorba. Burnet (See Poterium).

Red, or, as it is sometimes called, Broad Clover; thrives best on a firm heavy soil. By the frequent sowing of this seed, the quantity of food for cattle has been much increased, especially on clayey lands, which, before the introduction of this practice, produced very little. At the same time it enriches the soil, and prepares it for a crop of grain; and it is now indeed common, where the land is kept in tillage, to lay down the ground with clover, after having had two crops of corn, whereby there is a constant rotation of wheat, barley, clover, or turnips, on the same land. The clover-seed is generally sown with the barley in the spring; and when the barley is taken off, the clover spreads and covers the ground; and this remains two years, after which the land is ploughed again for some kind of grain.

The roots of this plant decay after they have produced seeds; but by eating the clover down, or mowing it, when it begins to flower, the roots are made to send out new shoots, and the plant continued longer than it usually does. The common allowance of seed for an acre of ground is ten pounds. In the choice of the seed, that which is of a bright yellow colour, inclining to brown, is to be preferred; but the pale-coloured thin seed should be rejected. The clover-seed should be sown after the barley is harrowed in, otherwise it will be buried too deep; and after the seeds are sown, the ground should be rolled, which will press the seeds into the ground: but this should be done in dry weather, for moisture will often cause the seeds to burst; and when the ground is wet, the seeds will stick to the roller. The above is the method generally practised by most people, in sowing this seed with corn; but it will be much better if sown alone; for the corn prevents the growth of the plants till it is mowed and taken off the ground, so that one whole season is lost; and many times, if there be a great crop of corn upon the ground, it spoils the clover so that it is hardly worth standing; whereas, when it is sown without any other seed, the plants will come up more equal, and come on much faster than that which was sown the spring before under corn. It is therefore sometimes advisable to sow the seed in August, when there is a prospect of rain soon after; for as the ground is at that season warm, so the first shower of rain will bring up the plants, and these will have time enough to get strength before winter: and if the clover be well rolled some time in October, when the ground is not too wet, it will press the ground close to the roots, and cause the plants to send out more shoots: the same should be repeated in March, which will be found very serviceable to the clover. The reason of preferring this season to the spring for sowing this seed is, because the ground is cold and wet in spring: and if much rain falls after the seeds are sown, they are liable to rot in the ground.

However, the most usual time of sowing the red or broad clover is the spring; for though it will come up well if sown in autumn, it is, while young, very liable to be killed by frost; and many crops which have come up finely in autumn, have been totally destroyed by the frost in winter, particularly in strong moist soils, where the greatest crops are commonly produced when sown in the spring. Towards the latter end of May, or beginning of June, this grass will be fit to cut, when great care must be taken in making it into hay, as it requires more labour and time to dry than common grass. The proper time for cutting is when it begins to flower.

Some farmers cut two or three crops of this grass in one year; but it is better to cut only one in the spring, and feed it the remaining part of the year.

Great care should be taken that the cattle when they are first put into this grass, do not eat too much.

When the seeds are intended to be saved, the first crop in the spring should be permitted to stand until ripe, which may be known by the stalks and heads changing to a brown colour: it should then be cut in a dry time, and, after being well dried, housed till winter, when the seeds should be threshed out. If, however, seeds be wanted for immediate sowing, it may be threshed before it be housed or stacked.

In Kent this clover is sown among barley or oats, in the spring, upon land that is clean and in good order. It is sometimes mown three or even four times in the summer, on rich warm soils; but the general custom is to mow the first growth and feed the remainder, or to feed it at first to the beginning of June, and then save it for a crop of seed. Sometimes also two crops of hay are taken, and on poor land farms much

clover is fed off with flocks of sheep, entirely folding the land over for wheat; for which crop no tilth whatever is so good and advantageous.

White Clover. This grows naturally in many pastures. Its branches trail upon the ground, and send out roots from every joint; consequently thicken, and make the closest sward of any of the sown grasses.

From these circumstances it is not so apt to be thrown out as red clover; nor is it ever destroyed by any accident, if the earth be rich and firm: frequent rolling makes it flourish abundantly, even on light soils; but without that, on such soils it inevitably perishes. It is a very sweet feed for all sorts of cattle: and hence when land is laid down for pasture, with intent to continue so, it should be sown with seeds of this kind. The general allowance of seed is eight pounds to an acre, but it should never be sown with corn; for if there be a crop of corn, the grass will be so weak under it as to be scarce worth any thing. If this seed be sown in the spring without corn, there will be a crop of hay to mow by the middle or latter end of July, and a good after-feed for cattle the following autumn and winter. The seed of this sort of clover may also be sown in autumn, in the manner directed for red clover. This autumnal sowing, if the seeds grow kindly, will afford a good early crop of hay the following spring; and if, after the hay is taken off the land, the ground be well rolled, it will cause the clover to mat close under the ground, and become a thick sward. The seed of this kind of clover may be procured by pursuing the same method as practised for red clover.

Hop Clover. This kind of clover is highly advantageous, from its growing and flourishing on almost any kind of soil, and on the most barren sands; whence it is a very proper grass to cultivate on those unfertile soils where other grasses that are worth notice will not grow at all. It does not swell cattle as the red clover does. In good ground it continues long, and bears very good crops.

Trefoil. This is sown in some places on chalky and other poor dry soils in the spring, with other grains, in the proportion of about two gallons of seed to the acre, and the crop affords a very fine food for sheep to graze in the summer months. In Kent, when it is intended for seed, the crop is mown about the first or second week in July; and is frequently thrashed off the straw in the field on a sail-cloth.

Sainfoin. Most dry lands will produce this plant, though it thrives best on a fine rich soil. Mr. Kent says it should be introduced where there is a chalky, marley, or gravelly bottom. In the Isle of Thanet, the land is always exceedingly well prepared, before the seed is put into the ground, by frequent ploughings; and the weeds or roots of grass are carefully picked off. Grass is a very great enemy to this plant, for without the utmost care it soon chokes and destroys it. The seed is sown in April, according as the season suits: dry weather is best, provided it do not continue long. The quantity of seed allowed to an acre is five bushels: of course it is sown very thick. When it is come up, it is carefully hoed and weeded, to keep the common grass down.

Wherever this crop takes, it is very advantageous, yielding plenty of excellent fodder for many years. It is customary in some places for farmers, when they intend to break up a sanfoin lay, to feed it the last three or four years.

Lucern. This will grow on almost any soil, provided it be not too wet; but the strongest land is to be preferred. The ground should be prepared in the same way as for barley, by ploughing, harrowing, and cleaning it from weeds. This being done, the lucern is generally sown broad-cast in fine weather, in the proportion of about fourteen pounds to the acre. This quantity of seed will be sufficient to supply the number of plants that will be wanted to yield a full crop.

Before the last ploughing, the land should be manured, yet not with old rotten stuff as is commonly done, but with fresh stable-dung, that has been thrown up in a heap three or four weeks to heat and ferment. The dung in this state is to be laid on the land and ploughed in as soon as possible. The land must then be harrowed and sown, and afterwards harrowed again with a light or bush harrow; and lastly, rolled to settle the ground and break the clods. This seed may be sown from the beginning of March to the end of May; but April, if the weather be dry, is probably the best season.

Lucern evidently requires to be constantly kept clean, and manured now and than. By some it is thought to answer the best when transplanted.

It is preferable to any other grass for horses, cows, and all black cattle, to be cut and carried to them to eat. It is asserted, that an acre of it in good ground, where it thrives well, will, from early in May to Michaelmas, maintain twice the number of cattle that an acre of good meadow will do.

Burnet. In Staffordshire this grass has been sown by many persons of late years, and by some on a broad scale; and it is said to be a valuable addition to cow pastures, hardy, and strictly perennial. Cows prefer it to clover, and it is doubtless wholesome for them: sheep and horses prefer clover; and it is by no means so productive as the broad-leaved red clover.

Hemp. This is cultivated to the greatest advantage on a soft, rich, loamy soil, in fine condition, and well manured.

As it is necessary to have the ground in very excellent tilth for this crop, the first ploughing should be given it as early in the autumn as possible; and it should be loosened very deep, and laid rough, that it may be the better mellowed by the winter's frost, especially if the soil be strong. And it should be ploughed again in February, or more early if the season will permit, when the manure is to be laid on. Horse-dung, or the scouring of ponds and ditches, are preferable to cow-dung, though all manures which render the earth light are fit for hemp. In this case, M. du Hamel thinks, that it is best to dung the hemp-ground every year before the winter ploughing, that the dung may have time to rot during that season, and that the spring plouging may afterwards mix it the more thoroughly with the earth: and in order to prepare the hemp-ground finally for receiving the seed, it should be laid as smooth and even as possible by the last ploughing.

The season for sowing hemp chiefly depends on the quality of the soil. In dry light ground, it should be sown as soon as the danger of frost, or other inclemency of the weather is over, in the latter end of April or beginning of May, that

it may get up early, and, by covering the ground, prevent the danger of drought. In wet cold grounds it should be sown later, as the middle, or even the latter end of May.

If this plant be cultivated principally for the seed, it is probably the best way to sow it thin, in order to give it room to spread and throw out many branches; and if the plants be raised on beds or ridges, in rows, and horse-hoed, the seed will be much superior to what is obtained from broad-cast hemp. This plant may also be cultivated to great advantage, in respect of both seed and hemp, by drilling it in equidistant rows, with hand-hoeing; which will improve the land and crop, with less manure than sowing it by hand.

The seed should be of the preceding year's growth, and every second or third year it should be had from a different soil. The weather, when the seed is sown, should neither be too dry nor too rainy. The best time is just after a gentle fall of rain. If the soil be deep, and in fine order, it is best to sow the seed thick, especially if the hemp be intended for fine uses, because the plants run most into height when they stand close together, and their fibres are then by much the finer: but they should not stand so thick as to choke one another, as this would occasion a considerable loss of plants. The usual quantity of seed is three bushels to an acre. As soon as the hemp-seed is sown, it must be carefully covered with earth, by means of the harrow, and the birds be kept from it.

Flax. This plant is cultivated both for its seed and inner bark: the former being used for the purpose of making oil, and the latter for that of linen. The soil most suitable for the growth of this plant, is the same as that for hemp.

When pasture land is broken up in order to its being sowed with flax, it must be made very fine by repeated ploughing, before it will be in a proper state for producing a good crop.

But when the ground on which flax is to be raised has been long in tillage, it should be ploughed deep before winter, and laid up in high ridges, in order that the frosts may the more effectually moulder and loosen it. And if stiff, care should be taken not to till it in wet weather, as it will be liable to clod. In February, if the land be not too wet, some very rotten dung should be laid in the furrows, and immediately covered over. And in March, for southern countries, or in the beginning of April where the climate is colder, another ploughing should be given to lay the land smooth, the clods should be broken by hand, or with the spike-roller, and the seed should be sown and harrowed in with a light or bush-harrow, so as not to bury it above an inch deep. Wet land should be laid in beds thirty or forty feet wide, separated by deep trenches, in order to drain off the water.

Flax-seed may be sown either in the autumn or the spring; but in cases where the winter is apt to be severe, and where the flax, which is but a tender plant, is in danger of being destroyed by it, almost all the flax is sown about the end of March, or in the beginning of April.

In order to obtain good seed, drill it in equidistant rows about a foot distant, and then hand-hoe it; which will keep down the weeds and improve the crop. But it is still better to drill the rows about twenty inches asunder; for the seed, being smooth and heavy, is very proper for drilling, and in this way a very small quantity of seed sows an acre. The common allowance of seed sown broad-cast is about two bushels and a half to an acre; but drilled in rows at twenty inches distance, half a peck is sufficient. Flax when sown thick, runs up in height, and produces a fine soft material; if sown thin, it does not rise so high, but spreads more, and puts forth many side branches which produce abundance of seed; and such seed is much better filled, plump, and heavy, than the seed produced from thick sown flax. Nothing should be planted or sown between the rows, but the ground should be hoed with a hand-hoe, or small plough, taking care that none of the mould is thrown against the rows; to prevent which the intervals may be hoed with a triangular harrow, having a proper number of iron tines in it, and guided by two handles fixed behind, which make the lines go deeper or shallower at pleasure. The rows must, however, be weeded by hand. Flax cultivated in this way is shorter than common, but stronger, and not so subject to be beat down and lodged in stormy weather. There is also sufficient room to hand-weed the rows, without laying upon or treading down the flax.

Hops. The land most suitable for the cultivation of hops, is that which has a rich, deep, mellow, dry soil, rather related to sand than clay, and the situation of which inclines to the south.

In the Agricultural Survey of Kent, it is observed, that when a piece of land is intended to be planted, the first thing is to plough it as deep as possible, early in October, and to harrow it level: it should then be meted each way, with a four-rod chain, placing pieces of reed or stick at every tenth link, to mark the place of the hills, which make 1000 per acre. This is the general method; but some few grounds are planted eight, and some twelve hundred per acre; some are also planted wider one way than the other, in order to admit ploughing between the hills instead of digging: but this practice, although it has been tried many years, does not seem to increase, on account of the difficulty of digging along the rows in which the plough cannot go: and which digs so much the worse, that an extra expense is incurred, and defeats the economy of the plan. When the hills are marked out, holes are dug about the size of a gallon, which are filled with fine mould, when the nursery-plants are placed in them. Some put three plants, others two, and some only one good one to each. If the land be planted with cuttings instead of nursery-plants, the holes are dug in the spring, as soon as cutting-time commences; some fine mould is provided to fill up the holes, in which are placed four or five cuttings, each about three or four inches in length: they are covered about an inch deep with mould of the same kind, and pressed down close with the hand. When the land is planted with cuttings, no sticks are required; but if nursery-plants be used, they require sticks or small poles, six or seven feet high, the first year: in both cases the land is kept clean during the summer, by horse and hand-hoeing; the next winter dug with a spade, and early in the spring the old binds are cut off smooth, about an inch below the surface; a little fine mould is then drawn over the crown of the hills. As soon as the young shoots appear, so that the hills may be seen, they are stuck with small poles, from seven to ten feet long, in proportion to the length it is expected the bind will run: these poles are called seconds,

and are generally bought in the woods at from 5s. to 8s. per hundred; three of which are placed to each hill. As soon as the binds get about two feet in length, women are employed to tie them to the poles. The land is kept clean during the summer, by horse and hand-hoeing, as beforementioned. The proper time for gathering them is known by the hop rubbing freely to pieces, and the seed beginning to turn brown They are picked in baskets containing five bushels each, and are carried to the oast in bags, at noon and evening, for drying. Great care and skill are necessary in this branch of the business; the smallest neglect or ignorance in the management of the fires will spoil the hops, and occasion great loss to the planter. When dried and sufficiently cool to get a little tough, so as not to crumble to powder, they are put into bags or pockets; the former containing two hundred weight and a half, and the latter one hundred and a quarter: they are then trodden very close, and the exciseman weighs them.

But the second year after planting, full-sized poles from fifteen to twenty feet in length, according to the strength of the land, are placed to the hills instead of the seconds, which are removed to younger grounds. Here great care is necessary not to overpole; for by that means young grounds are often much weakened; and it is equally necessary not to overdung them, as that will make them mouldy. About fifty cartloads of well rotted farm-yard dung and mould, once in three years, are generally considered as sufficient for one acre of land.

3. *Of Ingathering, including Reaping, Stacking, and Hay-making.*

Reaping. This is performed in different ways in different counties, but chiefly either by the sickle or the scythe.

Wheat when weedy should be cut some days sooner than common, that the weeds may have time to wither before the corn becomes too ripe: for if it be not cut till the grains are fully ripe, it will be liable to considerable damage by shedding, loss of colour, and injuries from rain, whilst it remains exposed for the purpose of drying the weeds. A day's gentle rain, or even a single shower, can do much harm: all possible care should therefore be taken to guard against its being much wetted.

Although corn is sometimes bettered by lying a little in *swarth* or *grips*, to take the dews, which contribute to render its grain plump and of a good colour, in hot dry summers, when the corn ripens fully, and its own vigour gives a proper colour and plumpness to the grain, so that the husks readily yield their contents when threshed, wheat need not lie out in grip before it is sheaved, or in sheaf, unless very full of grass and weeds. When the harvest is wet, small sheaves are best, because, thin at top, and falling close, the rain does not sink down into the middle of them, and so go through into the bands, as it is apt to do in great sheaves, which lie broader, and take a larger compass. Small sheaves are also best when many weeds are intermixed with the corn; because the air, wind, and sun have then a greater power to dry them, than they could have if the sheaves were of a larger size.

For every purpose, and in whatever way corn is cut, it should be bound up into sheaves before it is led, if economy be aimed at, and the neater these sheaves are done up the better: for the expediting the loading and unloading, and the saving the waste that would accrue by shaking, and while carrying it about loose in forking, will always do much more than pay for the expense of binding, even where the corn has been cut down by the scythe; forking is a slovenly practice, which cannot be advisable in any case.

In Lancashire, though the grain is generally reaped, some farmers have lately mown it. The wheat is mown *in*, that is, thrown towards the standing corn, immediately gathered and tied up into sheaves: the set consists of two mowers, two women gatherers, and one man binder. The barley and oats are mown *out*, into swathes, and gathered at convenience. The advantages of this method are, a saving of expense about fourteen pence per acre, less danger of the corn being shook out of the ear, and gaining nearly one-third more straw; no trifling consideration under several heads, especially since it does not appear that what stubble is left in the field is of the least service, but in some instances evidently does harm, as to clover or other young grasses, by retaining moisture through the winter, and starving the tender plants, or injuring the hay when mown, which, when wet, it has a tendency to render putrid. After the corn is gathered, the ground is gone over with a rake, to collect what straggling ears may remain, which are generally the heaviest, and of superior quality. This is done by a wooden rake, with teeth about one inch longer than the common hay-rake, which is preferred to the drag-rake, and does its work much neater: a woman can rake about two statute acres per day. The scythe for cutting the corn has an addition of a bow, made out of a piece of rod-iron, fastened into the pole, and extending three inches over the scythe-heel, whence it rises about nine inches in height and about two feet in length, and which forms a kind of cradle. This rod is supported by an upright prop from the pole about the centre, and which is further braced and kept tight by a string.

Of Stacking Grain. In order to preserve corn in the straw, it is very common to make it up into stacks. When this is done, it is necessary to make a kind of ground-work, letting the grain rest upon pieces of wood laid across each other, or put over posts into the ground for the same purpose. In Hampshire and other counties, where they have plenty of stone, stone forms the supporters, which is probably the best way.

Mr. Marshall thinks, that a square is the best form of a stack-frame at bottom, as being more pleasing to the eye, taking less thatch, and standing firmer than any other. The stem should be carried up as plumb as possible, except in the last course, which should project five or six inches, to form the eaves; for the weight of the roof will press out the upper part of the stem sufficiently. If it over hang in making, its own weight and the weight of the roof will squeeze it too flat. The stem must contain about two-thirds, and the roof one third, of the whole stack. If built on a frame, the stem may contain less, and the roof more; but if on a bottom, the contrary. And the corners of the stem should not be made too sharp. The ends of the roof should have a gentle projection, answerable to the stem; and the sides should be carried up rather convex than flat or concave. Perhaps a roof which is gently convex shoots off the rains better than any other. Corn-stacks should not be made too large, as the risk of making and getting-in is

much less on small than on large stacks: besides, large stacks do not settle so true as small ones, and consequently do not stand the weather so well. Anderson asserts, that the farmer would derive considerable advantages from putting up all his corns under permanent roofs, which, he says, might be constructed at little expense, without having any walls, by means of posts placed perpendicularly on each side and across the building, at the distance of six feet from each other; the whole supporting a roof.

In this way the whole corn of a farm may be perfectly secured against sustaining any damage from the weather in any season; and thus a considerable expense on some occasions, and an amazing waste on others, be entirely prevented; while the straw in every case will be nearly as good as hay, and the quality of the grain much better than it ever can be, if subjected to rain after it has been reaped. For it has been found by experiment, that if grain has ever been wetted from the time it is cut down, it never can be brought to the same state of perfection it would have had otherwise: nor can any art ever make the same corn, if it have been once wetted, shrink into so small a bulk, or become so weighty, as it would have been if it had been thoroughly *winn*, without any wet whatever. Nor does barley, that has been wetted and afterwards dried, ever malt so kindly as it would have done if kept quite dry. This last is probably a fact not very generally known.

Of Hay-making. When grass is to be made into hay, the farmer must be directed as to the season for mowing by its quality. If the crop be very great, it should, however, be cut as soon as the bottom of the grass grows yellow: and in other cases, where nothing prevents, it should generally be cut when the grass is in full bloom, before the stalks begin to harden. In some cases the ripe seeds add a great value to the hay, as in sainfoin and burnet: and in others, the growth of the grass itself is of advantage, as in several kinds of meadow-grass. The process of making hay differs in some respects according to the nature of the grass; but in general, if the weather be quite fine, the grass may be spread out as fast as it is cut down, especially if it lie so thick in the swarth that neither the air nor sun can pass freely through it: but if wet be feared, it should remain in the swarth. At night, make it into grass cocks; and the next day, as soon as the dew is off the ground, spread it again and turn it, that it may wither on the other side; then handle it, and, if it be found dry, make it up into large cocks. Should the weather continue favourable during the second day, the grass will be so dry as to bear being kept in cock till the morning on which it is to be carted; previous to which it should be spread out again to receive a farther drying if necessary. If the cocks be made as tall and taper as is consistent with their standing safely, the winds, by passing through them, will dry them gently and equally; and though rain should fall upon them, it will not do much hurt, because the greatest part of it will run off directly, and the sun and wind will soon dry up that which may have penetrated into the cocks. When made in this way, they have a great advantage over the common small and low cocks: for if a rainy season come on, these last will be so thoroughly wetted, that the wind will not be able to penetrate sufficiently to dry them.

Where the colour of hay is particularly regarded, the best way of making it, if the weather be fair, is to open it perfectly and spread it thin, immediately after it is cut, and to have hands sufficient to turn and shake it, till the evening, when it should be made up into grass cocks. This method should be pursued every day till it is sufficiently dried.

In Staffordshire, the seasoning or making of clover and rye grass into hay is as follows: After mowing, the swathes are suffered to remain till they are well dried on the upper side; they are then turned over, and the other side dried in like manner, and afterwards turned a second time if necessary; they are then got together, raked, and carried to the stack: the stalks of clover take a good deal of time to dry thoroughly; the time for which is facilitated, as well as the effectual making of it secured, by sunshine and fair weather; and it is supposed to save itself best in the swathe unbroken.

In Lancashire, the mode is to collect the clover into small sheaves, which are kept straight; then twisted together in the top part, to admit the sheaf to stand upon its butt or bottom-end, when spread out, in the same manner that horse-beans have been frequently treated. If these little bundles, be not thrown down by the winds, they will resist more rain, if it should fall, than when lying on the surface of the ground; and if the weather be fine, having more surface exposed and open, the clover will cure the faster. Clover for hay requires to be made more dry than grass; for, if the sap be not thoroughly dried up, it often heats and is spoiled. Sainfoin also requires to be well dried, but not quite so much as clover; neither of these are apt to fire in a stack; but frequently, if carried too green, will burn to a coal.

In stacking hay some persons carry tunnels up their ricks, either by drawing up a binding of wheat straw, or by actual tunnels of wood: these are meant to discharge a part of the vapour generated in fermentation, and thus to prevent any danger of the hay firing: those who practise it remark, that they can carry their hay a day or two the sooner. But many farmers never use any such precaution; nor is it necessary, if the hay be sufficiently made, and put together in stacks not too wide at bottom. A bottom four yards wide at the beginning is enough, if the sides be a little sloped outwards, and the stack carried to a sufficient height. The propriety of discharging any part of the vapour arising by fermentation from hay-stacks has indeed been questioned by some, who think it should be smothered and retained in the hay as much as possible, and that no other precaution is necessary than due attention to the hay-making.

To which we may add, that the admission of air, though it tends to dry the hay when unduly moist, very much increases the disposition to fire; for nothing so much promotes combustion as a free exposure to air, or checks it so much as a want of communication with air. Every one must be aware of this who has seen how readily a chimney when on fire has its fire extinguished by merely excluding the air by a *wet blanket hung over the fire-place.*

4. *Of Fruit Trees, Timber, and Underwood.*

Fruit Trees. In many counties the growth of fruit for immediate consumption or the purpose of making liquor from its juice, constitutes a very profitable part of husbandry. The fruits

chiefly cultivated with this view are, the Apple, Pear, Cherry, and Filbert.

APPLES. There is but one natural species of this fruit, the *Pyrus malus*, or crab. The very numerous sorts cultivated by those who are engaged in this part of husbandry, are mere varieties.

Those, therefore, who are anxious for the improvement of this fruit, should endeavour to procure the best varieties, and, after improving them as much as possible by cultivation, to preserve them in that state by artificial means of propagation. But even this method is limited, for art can only prevail for a time. Thus, most of the old fruits, as the Red Streak, the Stire Apple, and the Squash Pear, are either lost, or very much on the decline.

In raising this fruit, the seedbed should be adapted to the intention of the planter. Where new varieties of fruit, or the improvement of old ones, is the object, the seed-bed should be made as rich as possible: But on the contrary, where the preservation of varieties is all that is wanted, an ordinary loamy soil is sufficient. In either case, it should be perfectly clean, from root-weeds at least, and be double dug from a foot to eighteen inches deep. The surface being levelled and raked fine, the seeds are to be scattered on, about an inch asunder, and covered about half an inch deep with some of the finest of the mould previously raked off the bed for this purpose. During summer the young plants should be kept perfectly free from weeds, and in the ensuing winter they may be taken up for the purpose of transplanting; or they may remain in the seed-bed until the second winter, if not crowded.

The nursery-ground, like the seed-bed, should be enriched agreeably to the general intention; and in common good management, be double dug at least fourteen inches deep, but eighteen or twenty is always preferable. The feeding plants should be sorted, according to the strength of their roots, that they may rise evenly together. The tap or downward roots should be taken off, and in this operation the longer side rootlets should be shortened. They should then be planted in rows, three feet apart, and from fifteen to eighteen inches asunder in the rows; care being had not to cramp the roots, but to bed them evenly and horizontally among the mould. If the plants be intended merely for stocks to be grafted, they may remain in this situation until large enough to be finally planted out. But it is propably a better way to transplant them into fresh, unmanured, well-dug ground, two years before they are transferred to the orchard or field, and to place them together that they may form regular globular roots. In raising or improving varieties, however, the nursery-ground should be naturally deep, well soiled, and highly manured. The plants must also be repeatedly moved at every second, third, or fourth year, that they may grow strong and vigorous by the addition of fresh earth. In pruning the plants, the leader should be particularly attended to. If it shoot double, the weaker of the contending branches should be taken off. If the leader be lost, and not easily recoverable, the plant should be cut down to within a hand's breadth of the soil, and a fresh stem trained. The stem boughs also require attention. The undermost of them should be gradually taken off by going over the plants every winter; always, however, cautiously preserving sufficient heads to draw up the sap. A good stem should be pretty tall and well proportioned.

In propagating and improving the varieties of this fruit by cultivation, care should be taken to collect the seeds from those which have the best flavour; and when these have arrived at a proper state in the seed-bed, choose from among them such plants as have the most apple-like appearance. Transplant these into a rich deep soil, in a proper situation, letting them remain until they begin to bear. With the seeds of the fairest, richest, and best-flavoured fruit, repeat this process; and, at the same time, or in due season, engraft the wood which produced this fruit, on that of the richest, sweetest, best-flavoured apple; repeating this operation, and transferring the subject under improvement from one tree and sort to another, as richness, flavour or firmness may require, until the desired fruit be obtained.

In the planting of fruit-trees, different distances are preferred by different planters. In the grass grounds of Gloucestershire, and the arable fields of Herefordshire, twenty yards is a common distance; but twenty-two yards is perhaps better. In grounds, the trees should be planted in cross-lines for the conveniency of ploughing; but in orchards, it is better to set them in the *quincunx* manner, that they may have room to spread on every side.

Pruning is an important circumstance in regard to the health of trees and their bearing; for if this be judiciously managed they will come into bearing sooner, and continue in vigour for nearly double their common age. In performing this operation, no branches should be shortened unless for the figure of the tree, and then they should be constantly taken off close at the separation; by which means the wound soon heals. The more the range of the branches shoot circularly, a little inclining upwards, the more equally will the sap be distributed, and the better will the tree bear. The ranges of the branches should not be too near each other, as all the fruit and leaves should have their full share of the sun. Where it suits also, let the middle of the tree be free from wood, so that no branch ever cross another, and all the extreme ends point outwards.

In pruning, all the branches that are any way decayed or galled, or which possess any curled leaves, are to be cut out; after which the tree is to be thinned to give it an uniform head, and to let the air and sun be freely admitted. The stumps must next be taken off close to the parts of the tree whence they shoot out. In doing which, particular care must be had that they be cut close, smooth, and even without shivering the bark. The cut ends next the tree, after being smoothed with a knife, should be immediately rubbed over with a substance composed of tar and corrosive sublimate.

When trees are much thinned, they are subject to throw out a great quantity of shoots in the spring, which should be carefully rubbed off, as cutting increases their number.

Where the tree to be pruned is very old, and much incumbered, do not let in the cold winds; but carefully take off the stumps with all the decayed, rotten, and blighted branches. The truth is, whoever would form orchards to produce credit to himself and profit to his successor, must not suffer the trees to become old before these operations commence, but determine that pruning, cleaning, and rubbing off the rotten bark, shall

begin in the nursery, and regularly continue to the extremity of old-age; upon which plan very little wood need be taken off at a time; no standard fruit tree should be suffered to remain incumbered with rotten and decaying branches; for these, admitting the water into the tree, and contaminating the balsamic virtues of the sap, lay the foundation of sure destruction to the tree, and furnish to insects a nidus under the rotten bark, in which they deposit their eggs.

Nurserymen should be attentive to their grafts, for more depends upon this than is imagined; since when the grafts are full, well wooded, clear, and properly chosen, the fruit will be both large and higher flavoured. Though the soil and culture may be the same, the health of the wood of the tree is also materially affected during the whole time of the tree's existence, by the proper maturity of the scion at the time of its being put into the stock.

The fruit should not be gathered till fully ripe, and it will quit the tree by gentle shaking: if gathered earlier, the liquor which is prepared from its juice will be rough, hard, and seldom pleasant or good flavoured. The apples may be laid on the ground in a fruit-yard; but it is better upon a gravel walk, as the wet will then run from them, and they will lie dry in the bottom; and they should not lie thicker than ten or twelve inches. They are better kept without than within doors. Care should be taken to place fruits of equal ripeness and good qualities by themselves; for if of different ripeness the cyder will be apt to ferment too much, which will make it grow hard, and never be rich, full, and fine flavoured.

Cyder is the purpose for which apples are chiefly grown in many counties. The manufacture of it is a chemical process, which does not seem to be yet conducted on any fixed or regular plan, as we find different manufacturers recommending different modes of collecting and managing the fruit, as well as of conducting the several processes in the preparation of the liquor. The following is the method proposed by Mr. Morse, and which seems to be sufficiently clear and simple:

When the fruit is thoroughly mellow, it must be first committed to the cyder-mill and be ground to a fine pulp, that not a morsel of apple may be seen; by which means the kernels and rind will be well broken, and will give the liquor a fine flavour. Let it then be put into tubs or hogsheads with one head out, and remain there two days; after which press it through hair-cloths, and put the juice into hogsheads, when it has been here a a few days it will work and throw up a thick substance at the bung-hole, somewhat like barm, but of a darker colour: when this appears it should be immediately racked into a clean cask; for, if the substance be suffered to fall, the grounds from the bottom will rise, and the whole will be in a ferment and very foul, and perhaps must be racked three or four times before it can again be separated, which will run a risk of making the cyder harsh. So long as it remains fine and free from fermenting, it may continue in the cask; but if it ferment much it should be once more racked, and the grounds or lees taken from it. These may be dropt through a bag or bags of coarse cloth, made in the form of a jelly-bag, with a hoop sewn round the top large enough to hold about a pail-full: by doing this very little cyder will be wasted, and the droppings added to the cyder will be to keep it from fermenting, and also help the colour. It often requires four or five rackings. Cyder made with different sorts of apples keeps best by breaking and mixing together; but this should not be done until it is fine, when the proprietor may blend it to his palate. After the whole is finished, a bung may be placed over the bung-hole, but it should not be close stopt until February or March, when it will be fit for sale or use. If cyder do not fine, some farmers use isinglass. In this case, for one hogshead of a hundred gallons beat about one ounce and a half into small pieces; add to it about two quarts of liquor, and whisk it together; the next day add more liquor, and wisk it again: and repeat this until it be dissolved. Rack your foul liquor, throw in the dissolved isinglass, and stir it together with a stick. As soon as the cyder drops fine, rack it off into a clean cask. Cyder should not be bottled until sixteen or eighteen months after it has been made, as it will endanger the breaking the bottles, if put into them sooner.

Pears. These are also a species of the genus *malus*, distinguished by the trivial name *communis*. The numerous sorts cultivated are mere varieties of this species: the mode of cultivation is the same as for the apple; and its juice constitutes *Perry*.

Perry. The same method must be followed as in making cyder. The best pears for perry, or at least the sorts which have been hitherto deemed the best, are so excessively tart and harsh, that they cannot be eaten as fruit. Of these the Bosbury pear, the Bareland pear, and the Horse pear, are most esteemed perry in Worcestershire, and the Squash pear, in Gloucestershire; in both which counties, they are planted in the hedge-rows and common fields. Pear-trees will thrive on land where apples will not even live, and some of them grow to such a size, that a single pear-tree, particularly the Bosbury and the Squash kind, has frequently been known to yield, in a single season, from one to four hogsheads of perry. The Bosbury pear is said to produce the most lasting and the most vinous liquor. Pears like apples, should be fully ripe before they are ground.

Cyderkin and *Perkin*. These liquors are prepared by pouring boiling water on the dregs that remain after the making of cyder or perry, in the proportion of about one-half the quantity of the liquors that have been previously drawn. After being left to infuse for thirty or forty hours, the infusion should be well pressed, and what is thus squeezed out will be fit for use.

Cyder Wine. This has been prepared in America, and even in this country, from the juice of apples by boiling. For this purpose a browning copper is made use of, in which the fresh apple-juice is evaporated, until one-half of it is dissipated; the remainder being then conveyed into a wooden cooler, and afterwards into a proper cask, to which yeast is added, and the liquor fermented in the usual way. It is probable that the liquor thus prepared contains a small quantity of copper.

Cherries. The Kent growers generally prefer for this fruit a situation where there is a deep surface of loam upon the rock; but some assert, that there is not any necessity for a great depth of soil. In regard to distance, cherry-trees ought to be planted according to their sorts; a *heart* requiring double the distance of a *duke* or *morello*. But when planted by themselves, they are generally placed from twenty to thirty

feet apart, and are put somewhat deeper in the earth than apples; but in other respects the management is the same.

Cherry Wine. A cooling and pleasant drink is made from the juice of cherries, when properly fermented. For making this liquor the cherries should hang upon the trees till they are thoroughly ripe, in order that their juice may be better perfected and enriched by the sun; and they should also be gathered in dry weather. The juice is then to be pressed out, and a quantity of sugar proportioned to the intended strength of the wine is to be added, and the whole regularly fermented. When the wine is become fine, it must be bottled for use.

Filberds. This fruit is much grown about Maidstone. The best soil is the stone-shattery sandy loam, of a quality somewhat inferior, as it is a disadvantage for the trees to grow with great luxuriance, they bearing most nuts when but moderately strong. If planted among hops, without apples or cherries, they are put about twelve feet apart: when the hops are dug up, the filberd plantation is kept clean by repeated digging and hoeing; and great skill is necessary in pruning, to make them bear well. It is indeed entirely owing to skill and management in this operation that the trees are rendered productive upon even a favourite soil. These trees are generally trained in the shape of a punch-bowl, and never suffered to grow above four or five feet high, with short stems, like a gooseberry-bush, and exceedingly thin of wood. If suffered to stand till ripe, this fruit will keep good for several years in a dry room or closet; but when gathered, it should be laid thin on the floor of a room where the sun can enter to dry it properly.

Plantation of Timber-trees. Waste and barren lands may be very conveniently improved by planting trees on them. There are few fields, which do not admit of being brought into culture, under particular circumstances; and there are innumerable tracts of vast extent in this kingdom, which it would be much more profitable to the owner to plant with trees, than to attempt any other mode of improvement. Wherever the soil is dry and infertile; or where its chief or only produce is health; or where it is full of rocks and stones rising to the surface; or a stiff obdurate clay, having little surface produce; and in general, wherever the soil is poor, if not in the very near vicinity of a town, it may be converted into plantations, if it can be freed from hurtful water, with greater profit than any other improvement it could admit of. Where the surface produce is naturally small, perhaps nothing could be so economical as, in the mean while, to fill it with trees; because these, if judiciously chosen, not only yield a greater profit than could be drawn from any other kind of produce, and afford conveniences for houses, and other accommodations for inhabitants and for manufactures, but the ground itself, while the trees continue to grow upon it, undergoes for the most part a gradual amelioration, which it would not have done in its natural state; and admits of being more easily improved when the proprietor can find leisure to overtake it, than it otherwise would have been.

The best kinds of trees to be cultivated, are the oak, ash, elm, beech, birch, chesnut, Scotch fir, spruce fir, and larch. Of these the oak is best calculated to thrive on the strongest and deepest clays; the ash loves a rich and mellow loam; and where that is the case it prospers best on rocky banks. The witch elm prefers also a mellow soil, and situations moderately damp, to such as are drier and more arid. The beech thrives remarkably well on dry gravels, and can bear a pretty exposed situation. The birch loves dry mellow soils, and will prosper well on land that is very sterile. The chesnut delights in deep loam, on a stone shivery bottom, where the roots run no risk of reaching a retentive clay or other stratum that detains the water. The Scotch fir as well as the spruce will grow well on a light moory earth, if dry, though ever so poor, if cold clay or gravel, or sand, do not rise near the surface. Of all trees yet named, the larch prospers on the greatest variety of soils: it seems however to prefer a mellow loam to either of the extremes of clay or sand. And as this tree is undoubtedly the most useful of the coniferous tribe, as well as quickest grower, and the most ornamental of that class, it deserves above all others the attention of the rural improver.

No custom deserves to be so much reprobated as that of pruning up trees, by divesting them of their lower and lateral branches. When a plant is very young this is sometimes allowable, to a certain distance; yet it should always be done with great caution; but when trees have begun to form themselves it is a sort of murder—it stops the growth, and produces extreme deformity; for the sap in the spring of the year, being checked in its natural diffusion into the number of branches into which it used to flow produces distortions.

Underwood. The stocks which produce coppice underwood or being in fact only pollard trees growing under ground, it is obvious that the produce of those stocks must, like the shoots of all other pollard trees, be the most abundant when the parent stocks are in the greatest perfection; that until they obtain that perfection, the produce must be small; and that, when they have past that perfection, they must gradually decline; it therefore follows, that to prevent the decay of woods, it is necessary, from time to time, to renew them by raising new stocks, to suppy the place of those which from time to time wear out and decay. But besides the constant and regular decay of age, to which all woods are liable, there are many peculiar injuries to which these are subject, and which must speedily and prematurely bring on decay, unless proper and effectual methods are taken to prevent such mischiefs.

The first evil is, the custom of suffering cattle to feed in woods, under an idea that, after they are of a certain age, (usually seven years) the shoots are grown out of the way, and the cattle can do no harm. In strong, thriving, flourishing woods, it is possible that the cattle may do but little harm to the underwood, after it is seven or eight years old; but all the young plants, which either spring up spontaneously or are planted in them, will be liable to be cropped and kept down by the cattle, and few of them can come up to perfection. And in weak decaying woods, there is always a great deal of the underwood so low, as never to get out of the reach of cattle, being continually liable to be cropt and kept down by them, whereas the decay of the stocks is much hastened.

A second cause of early decay in woods, is the difficulty of draining such parts of them as are subject to be moist and damp; nothing being so prejudicial to wood as extreme wet. A third

cause of decay, is the custom of suffering woods to grow too old before cutting, whereby the strong shoots smother the weak ones, and, by their dropping, kill the stocks on which they grow. To this may be added the practice of permitting the buyer to cut his own wood, hereby making it his interest to destroy every sapling, and to cut the underwood as close to the stock as possible—(which in old woods is very prejudicial to the succeeding shoots)—as also the custom of not obliging buyers to clear the woods early in the summer, so as to prevent the new shoots from being injured by their cattle, carriages, and other circumstances.

Now, if it be profitable to plant new woods, it must be certainly much more so to protect those that are already planted, to fill them up where thin, and to restore them when in a state of decay. The expence is not only lessened by the saving of new fences, but the profit is greatly increased, by the rapid growth of the wood, when planted in situations that are sheltered by other woods already planted. In woods where saplings spring up in great numbers spontaneously, their growth should by all means be encouraged. At the time of cutting the underwood, these saplings will perhaps be 14 or 15 years old; and it may perhaps be proper, after leaving for timber-trees such as are straight and handsome, to cut off the rest for underwood. But great part of the saplings so cut off at that age, will not be large enough to produce shoots sufficiently strong to get up as fast as the other underwood. These shoots must therefore suffer, and the stocks can never come to perfection. It is, hence, more advisable not to cut off such saplings as are intended for underwood, until the second cutting of the coppice, when (being perhaps near 30 years old) they will throw out shoots strong enough to fight their way, and keep pace with the surrounding underwood. But where saplings do not spring up in abundance spontaneously, young trees must be planted; part of which may be preserved for timber, and the remainder left, to be stubbed off at a proper time for underwood.

The kinds of wood to be planted in coppices, either in making new ones, or filling up old ones, must be regulated, partly by the demands of the country, but chiefly by the peculiar aptitude of the soil and situation to produce particular sorts. Let nature be your guide in planting, and you will seldom do wrong.

Particular soils and particular situations, will always favour particular kinds of trees; we need not look for the reason, but only to the fact. The chalk-hills of Hampshire are peculiarly proper for beeches; for the beech perfects itself here without trouble, the flinty loams and clays of the same county, for oaks and ashes; the mossy steep sides of the Wiltshire downs, for the hazel; and the sands of the same county, for the ash; the rugged and almost naked rocks of Mendip, in Somersetshire (near Cheddar), produce the lime tree and the walnut in the greatest luxuriance; and on the highest parts of the same Mendip hills, where no other tree can stand the sea breeze, sycamore flourishes as well as in the most fertile valley. But taking the general demand of countries, and the peculiarities of different soils, into consideration, there is no kind of wood so generally proper for planting in coppices, as the ash. The value of ash-poles being at least one-third more, and frequently as much again, per hundred weight, as that of other poles; the timber always in request, and saleable at any age or size, at almost the price of oak; and the wood itself as quick a grower as any, and quicker than most; and above all, there being but few soils, from the blackest and wettest bogs to the highest and most exposed mountains, where it will not grow; are reasons why ash is one of the most profitable woods to plant in such coppices as are favourable to its growth. In soils and situations where the ash does not grow kindly, let such other sorts of woods be planted as appear to thrive best in similar soils and situations in the same country. The Spanish chestnut, though not so general a grower as the ash, is a most excellent wood, either for timber or underwood, and wants only to be more known to be higher in estimation. It partakes much of the properties of the oak, but excels it in two points, viz. that it grows faster, and that the sap part of the timber is firmer and less corruptible. To fill up woods that are grown thin by age or neglect, the proper time is one year, or at the utmost two years, after the underwood is cut. The young plants should be eight or ten feet high, and an inch and an half in diameter at the ground, and planted without cutting off. If the soil be dry, no other preparation is necessary than barely digging the holes for the plants. If wet, deep drains should be made to take off the superabundant water. The earth dug from these drains should be thrown out on the lower side of them, and upon this new earth the plants should be planted. If land of this latter description be black and peaty, the ash is peculiarly proper for it; and will, if planted on the earth thrown from the drains, make a most surprising progress. If it be a stiff yellow clay, it is generally more favourable to the growth of oak than of ash. In such soils, oak for timber, with a mixture of willow, birch, alder, and Spanish chestnut, for underwood, will perhaps be the most proper. All these kinds should stand one round of the underwood, and, if still weak, two, before those are cut off which are intended for underwood. Birch plants are indeed an exception to this rule: they should always be cut off the first round of the underwood; for, if they are large when cut off, the stocks frequently decay and die. In all mixtures of kinds of wood for coppices, those sorts should be used which are not unfriendly to each other, and which will come round fit to be cut together at the same periods; and such kinds should be allowed to stand for timber, and that at such distances as to injure the underwood as little as possible. The plants for filling up old decayed woods should be the strongest and best of their kinds. Those which are weak at first will be drawn up by the surrounding underwood, and become from their increased height still weaker. At the next cutting of the underwood, they will be blown down; or, if cut off, the shoots will be too weak to grow up with the other underwood. Oak, ash, and Spanish chestnut should be kept in a nursery for this purpose: alder and birch plants grow plentifully, spontaneously in some countries, and may be taken up for use: if none such are to be obtained, they may be raised from seeds sown on a moderate hot-bed in the open air. Alder is sometimes propagated by taking up old roots, and dividing them into several parts; and hazel may be propagated the same way. Willow is generally planted in cuttings; but a much better method, where there are any old willow stocks, is to plash down the shoots to fill up the vacant places round such

stocks. The wild cherry, which will grow on almost any soil, and is easily propagated, makes an exceeding good underwood, though hitherto it has been but seldom used for that purpose.

In choosing spots for making coppices, care should be taken to select such soils and situations as are proper for the growth of those kinds of wood intended to be planted; to drain them well if wet, and particularly to fence them well from cattle; if they be covered with bushes and briers, to let those remain for shelter for the young wood; and if there happen to be a moderate quantity of young oaks and ashes on the spot, to let them stand by all means, always keeping in mind how necessary shelter is, for the growth of wood of all kinds. But in newly planted woods, where all the plants are of the same age, there is not the same reason for letting them stand before they are stooled off for underwood, as before directed for young trees planted to fill up old woods. Those which are intended for underwood may, in such newly planted woods, be cut off when planted, or at any age from eight to fourteen years, without injury: indeed, young woods should not stand too long previous to the first cutting.

The periods of cutting underwood must be regulated by the luxuriance of its growth, and by the demand of the country, and the uses to which the wood is to be applied. In the article of underwood, not only the interest of money, but the loss of the succeeding growth, tell against the value of standing wood after it is fit to cut, and make it doubly the advantage of the owner to cut his underwood as early as it is saleable. As soon, therefore, as any kind of wood is fit for the uses of the country, it should then be cut; unless it can be made to appear, that it will pay compound interest for standing longer, or, in other words, will pay not only the simple interest of the first value, but also the loss of so many years growth of the wood, as so far advanced towards another crop. Wood merely for fuel, can scarcely be cut too young. Hazel is usually fit for hurdles and dead hedges, from nine to twelve years old; ash for sheep cribs, at the same age; and ash and other woods, for hop-poles, from eleven to fourteen years old; while ash for carpenters and other large uses, alder, birch, and willow, for rafters, turnery, pattens, clogs, coalpit uses, &c. must stand from sixteen to twenty years old, before the poles are large enough for their respective purposes.

Yet, though various opinions have been advanced respecting the most proper time of the year for cutting underwood; but there is one rule which, on the seller's part, is without exception, viz. that the older the wood is, the later in the spring it should be cut. When old wood is cut early in the winter, and a hard winter follows, the damage done to the stocks is very great; young flourishing wood will bear cutting at any time. But on the part of the buyer it is allowed, that all woods are more durable, when cut in the most stagnant state of the sap; and in all uses where bending is required, such as hurdles, hoops, and even dead hedges, the wood cannot be cut too early in the winter, being, if cut when the sap is rising, brittle, and unfit for those purposes. Oak underwood will (at the present price of bark) pay well for standing till the sap is up for barking it, and it seldom happens that the stocks are injured by cutting it so late in the season.

The best way of *disposing* of underwood, to answer the purposes of the seller, is to cut it at the seller's expense before it is sold; to lay it out in ranges or drifts, according to the custom of the country; to value it in that state, and sell it in such sized lots as the number of buyers will warrant; and particularly to oblige the buyers to clear the whole out of the wood by the 24th of June, and never to suffer them to bring their horses into the woods (after any new shoots are shot out) without muzzling them, or at least tying up their heads.

PART III.

Of Breeding; or the Growth and Management of Live Stock.

The animals necessary to constitute the stock of a farm in full perfection must in a considerable degree depend upon the extent and situation of the farm, as well as upon the demand of the circumjacent towns or cities. Generally speaking, however, such stock will consist of, 1. horses. 2. Black-cattle. 3. Sheep. 4. Swine. 5. Poultry. 6. Bees.

Horses. Numerous as are the kinds of this noble animal, the only one that falls immediately within the scope of our present inquiry, is that bred for *draught*, the powers and properties of which we have already considered under the articles Cart and Draught-horse; and to these we refer the reader, in order to avoid unnecessary repetitions.

Under the article Draught Oxen, we have also entered at some length into an examination of the comparative advantage of horses and oxen for the purposes of husbandry, and have fully detailed our reasons for recommending a very extensive use of the latter.

We shall hasten therefore to the important question of the propriety of breeding cattle. It must not be supposed, that to derive advantage from cattle, it is alone sufficient to have a great number, and to give them the necessary fodder: there are many other circumstances to be attended to, without which it will be in vain to expect much profit from them. They are frequently kept in too narrow cow-houses, whence besides being liable to hurt one another, the most voracious starve their neighbours, by carrying off all the fodder within their reach, whence the injured cows insensibly decay, become languid, or give little milk. In summer the heat incommodes them; a circumstance which makes them grow lean, and diminishes the quantity of their milk. Care must therefore be taken that they have sufficient room in their stalls; that they may be cool in summer and warm in winter. At all seasons they should be kept dry, for this is a material point. Even in summer, wet is disagreeable to them, and in winter it chills them. To prevent this double inconvenience, it will be proper to pave the cow-houses on a gentle descent, and to dig a pit to collect all water and stale, which last may be appropriated for many useful purposes.

The principles of improvement to be attended to in breeding cattle, are the following: first, beauty of form. It is observable, however, that this principle was more closely attended to at the outset of improvement (under an idea, in some degree falsely grounded, that beauty of form and utility are inseparable) than at present, when

men who have been long conversant in practice, make a distinction between a useful sort and a sort which is merely handsome.

The next principle is proportion of parts, or what may be called utility of form, abstractedly considered from its beauty: thus, of the three edible species, the parts which are deemed offal, or which bear an inferior price at market, should be small in proportion to the better parts. This principle, however, appears to have been differently attended to in different species, and will require to be more particularly examined, in taking into consideration the separate purposes of each species.

A third principle of improvement, is the texture of the muscular parts, or what is usually termed flesh; a quality of live stock, which, familiar as it may long have been to the butcher and the consumer, has not, till of late been attended too by breeders, whatever it may have been by graziers, among whom the flesh is now spoken of with the same familiarity as the hide or the fleece, and it is clearly understood, that the grain of the meat depends wholly on the breed, and not as has been heretofore considered, on the size of the animal.

But the principal which at present engrosses the greatest share of attention, and which, above all others, is entitled to the grazier's attention, is fat, or rather the fatting quality: that is, a natural propensity to acquire a state of fatness at an early age, and, when at full keep, in a short space of time: a quality which is also found to be hereditary, or to depend in some considerable degree at least, on breed, or, as it is technically termed blood; namely, on the specific quality of the parents.

The midland breeders in this manner rest every thing on breed; under a conviction, that the beauty and utility of form, the quality of flesh, and its propensity to fatness, are, in the offspring, the natural consequence of similar qualities in the parents: and, what is extremely interesting, it is evident, from observation, that these four qualities are by no means incompatible, being frequently found united, in a remarkable manner, in the same individuals.

Without admitting, or objecting, in this place, that these four qualities are the only ones necessary to the perfection of the several species of live-stock now under review, we pass on to the means by which they have attempted to be accomplished.

The mode of improvement, in the established practice of the kingdom at large, has been till of late that of selecting females from the native stock of the country, and crossing with males of an alien breed; under an opinion, which has been universally received, that continuing to breed from the same line of parentage, tends to weaken the breed.

Rooted, however, as this opinion has been, and universally as the practice has prevailed, there is little doubt of the fact, that all our superior breeds of stock have been raised by a practice directly the contrary: by breeding, not from the same line only, but the same family: a practice which is now so long established, as to have acquired a technical phrase to express it by. Breeding *in-and-in* is as familiar in the conversation of midland breeders, as *crossing* is in that of other districts. The sire and the daughter, the son and the mother, the brother and the sister, are, in the ordinary practice of superior breeders, now permitted to improve their own kind; and through the assistance of this practice, the bold leader of these improvements evidently produced his celebrated stock.

The argument held in its favour is, that there can be only one best breed; and that if this be crossed, it must necessarily be with an inferior breed; the obvious consequence of which must be deterioration, not improvement: and the degree of excellency obtained, by the application of this principle, is not more remarkable than the rapidity with which the improvement of the several breeds has been carried on and extended, not over this district only, but to various parts of the island.

The breed of the midland counties is the long-horned kind.

Feeding and Fattening. For the purposes of fattening, cattle are generally bought in the spring, and about Michaelmas. Those which are bought at the former period, will be ready for the butcher in the summer, according to circumstances; but those that are purchased at the latter season, are either to sell in winter or in spring: they ought to be forward in flesh, to be improved the beginning of winter, and kept up during that hard season, either with burnet, hay, turnips, carrots, &c. in order to be fit for a good market whenever it offers; or they may be young lean cattle, which by their growth may pay for their wintering, and be fit to fatten the next summer. Some farmers upon ordinary land buy in young Welch heifers, which, if they prove with calf, are sold in the spring, with the calf by their side, for the dairy; while those that are not with calf are fattened: all which ways may turn to good account; but most commonly meat is one-third dearer in winter and spring than in summer, as provender in these seasons is obtained with difficulty.

In the wintering of cattle, it is necessary, about September, to turn out those you design to keep up for a winter or a spring market, and the cows that give milk, into rough pastures, till either snow or a hard frost comes on, as by these means they will need no fodder: but when either snow or frost arrives, hay must be given to such cows as are near calving, to those that have lately calved, or that give a great deal of milk, and also to your fattening cattle. This must be done every morning and evening, in proportion to the quantity of rough grass, &c. that there may be upon the ground. But for the lean cattle, straw will do well enough to fodder those that give but little milk; only you must observe to give barley-straw first, and oat-straw last, unless you value your milk: if you do, give such cows your oat-straw, provided the quantity of milk they give do not deserve hay, or hay be scarce; for barley-straw will take away the milk they have, though it is good food for dry cattle. When hay and carrots fail, scalded malt-dust and grains are frequently given to cows in winter, and produce a great deal of milk; the latter is, however, apt to rot them, if given in too great quantities, and continued too long.

When the pastures are eaten up, the milch cows must be housed, and hay be given them in the cow-house; as also to the other cattle in the yard; for which purpose two yards are necessary; one for the cattle which eat straw, with racks and other conveniences to fodder them in. They should be fed often, and not have too much at a time. The yards ought to be well sheltered,

and made as dry as possible, and a good deal of straw given them to lie dry and warm in; which is equally advantageous to the cattle and the increase of dung.

For feeding off land, beasts and horses may be introduced together, or beasts first, and horses afterwards; and after both, sheep. But the grass should not be too rank before it be fed.

Cattle are frequently fed in winter with rye-straw, mixed with a little hay; with the straw or haulm of buck-wheat; with the leaves of white beet; with turnips, the turnip-cabbage, carrots, cabbages, burnet, and the bruised tops of furze, &c. as has been already mentioned.

All fattening cattle, whether lambs, sheep, barren cows, or oxen, require a proportionable progression from coarser to better food, as they grow more and more into good flesh; otherwise when half fat they will go back, and are with great difficulty raised again, which is obviously a heavy loss to the farmer.

Farmers, in some parts of the country, are in the habit of fattening oxen, and other cattle, in stalls, on potatoes, hay, or straw; others prefer turnips and cabbages, and hay or straw, or even oil-cake and hay. By these means the cattle are frequently made very fat: but it is generally observed by the most experienced men, that this system is not profitable, the chief advantage being that of raising a supply of good manure for the arable lands: and hence this practice seems to be on the decline.

Cattle, when fed with cabbages, dung more, and make less urine, than when fed with turnips, and drink little water, which seems to prove that they are a better food for them than turnips. All cattle fed in this manner, should have about seven pounds of hay a day allowed to each.

Management of the Dairy. This is a matter of considerable nicety and importance, and with which every one engaged in this branch of husbandry should be well acquainted, as considerable advantages may follow from a judicious attention to the different processes.

Butter. Where this material is the object of the farmer, it is necessary to choose cows of a proper sort: for among this class of animals, it is found by experience, that some kinds give milk of a much thicker consistence, and richer quality, than others; nor is this richness of quality necessarily connected with the smallness of the quantity yielded by cows of nearly an equal size: whence it behoves the owner of a dairy to be peculiarly attentive to this circumstance. In judging of the value of a cow, it ought rather to be the quantity and the quality of the cream produced from the milk in a given time, than the quantity of the milk alone. The small cows of the Alderney-breed afford the richest milk hitherto known; but individual cows in every country may be found, by a careful selection, that afford much thicker milk than others: these therefore ought to be searched for with care, and their breed reared with attention, as being peculiarly valuable.

Few persons who have had any experience at all in the dairy way can be ignorant, however, that in comparing the milk of two cows, to judge of their respective qualities, particular attention must be paid to the time that has elapsed since their calving; for the milk of the same cow is always thinner soon after calving, than it is at a later period; as it gradually becomes thicker, though generally less in quantity, in proportion to the time the cow has calved. The colour of the milk, however, soon after calving, is richer than it becomes afterwards; but this, especially for the first two weeks, is a faulty colour that ought not to be coveted. In order to make the cows give abundance of milk, and of a good quality, they must at all times have plenty of food. Grass is the best food yet known for this purpose, and that kind of grass which springs up spontaneously on rich dry soils is the best of all. If the temperature of the climate be such as to permit the cows to graze at ease throughout the day, they should be suffered to range on such pastures at freedom; but if the cows be so much incommoded by the heat as to be prevented from eating through the day, they ought in that case to be taken into cool shades for protection, where, after allowing them a proper time to ruminate, they should be supplied with abundance of green food fresh cut for the purpose, and given to them by hand frequently in small quantities fresh and fresh, so as to induce them to eat it with pleasure. When the heat of the day is over, and they can remain abroad with ease, they may be again turned into the pasture, where they should be allowed to range with freedom all night during the mild weather of summer.

Cows, when abundantly fed, should be milked three times a day during the whole of the summer season, in the morning early, at noon, and in the evening just before night fall. For if milked only twice a day, while they have abundance of succulent food, they will yield a much smaller quantity of milk than if milked three times. In the choice of milkers, great caution is also necessary; for if this operation be not properly performed, not only the quantity of the produce of the dairy will be greatly diminished, but its quality also will be very much debased; since, if all the milk be not thoroughly drawn from a cow when she is milked, the portion left in the udder seems to be gradually absorbed into the system, and nature generates no more than to supply the waste of what has been taken away.

The following observations may also be worth attending to.

1st. The cows should always be milked as near the dairy as possible, to prevent the necessity of carrying and cooling the milk before it be put into the dishes; and as cows are much hurt by far-driving, it must be a great advantage in a dairy farm to have the principal grass fields also as near the dairy or homested as possible.

2dly. The practice of putting the milk of all the cows of a large dairy into one vessel, as it is milked, to remain there till the whole milking is finished before any part of it is put into the milk-pans, seems to be highly injudicious, not only on account of the loss sustained by agitation and cooling, but also, more especially, because it prevents the owner of the dairy from distinguishing the good from the bad cow's milk, so as to separate them from each other, where necessary. He may thus have the whole of his dairy product greatly debased by the milk of one bad cow, for years together.

3dly. If it be intended to make butter of a very fine quality, it will be advisable in all cases to keep the milk that is first drawn separate from that which comes last; as it is obvious that, if this be not done, the quality of the butter

will be greatly debased, without much augmenting its quantity. It is also obvious, that the quality of the butter will be improved in proportion to the smallness of the proportion of the last drawn milk that is retained; so that those who wish to be singularly nice in this respect, will do well to retain only a very small proportion of the last drawn milk.

4thly. When the quality of the butter is the chief object, it will be necessary not only to separate the first from the last drawn milk, but also to take nothing but the cream that is first separated from the best milk, as it is this first rising cream alone that is of the prime quality. The remainder of the milk, which will be still sweet, may be either employed in making sweet milk cheeses, or be allowed to stand to throw up cream for making butter of an inferior quality.

5thly. Butter of the very best possible quality can only be obtained from a dairy of considerable extent, for when only a very small portion of each cow's milk can be set apart for throwing up cream, and when only a very small portion of that cream can be reserved as of the prime quality, it follows, that, unless the quantity of milk be upon the whole very considerable, the quantity of prime cream produced must be so small as to be scarcely worth the while for manufacturing separately.

6thly. It seems probable that the very best butter can only be made with economy in those dairies where the manufacture of cheese is the principal object. The reasons are obvious: if only a small portion of the milk be set apart for butter, all the rest may be made into cheese while it is yet warm from the cow and perfectly sweet; and if only that portion of cream which rises during the first three or four hours after milking is to be reserved for butter, the rich milk which is left after that cream is separated, being still perfectly sweet, may be converted into cheese with as great advantage nearly as the newly-milken milk itself.

The necessary requisites of a good *milk-house* are, that it be cool in summer, and warm in winter, so as to preserve a temperature nearly the same throughout the whole year; and that it be so dry, as to admit of being kept clean and sweet at all times. This structure ought, if possible, to be erected near a cool spring or running water, where easy access can be had to it by the cows, and where it is not liable to be incommoded by stagnant water.

The precise degree of heat most favourable for the different operations of the dairy, is not yet determined; but until farther experiments shall have settled this point, we may take it as a safe rule, that the heat should be between 50. and 55. of Fahrenheit, and to ascertain this point, a thermometer should be hung up perpetually in the milk-house.

With respect to the utensils of the dairy, they must in general, from the nature of the business, be made of wood. But of late many persons, who affect a superior degree of elegance and neatness, have employed vessels of lead, or of common earthen-ware. Yet as the acid of milk is supposed to dissolve lead, brass, and copper, and to form with these a compound of a poisonous nature; such vessels should never be employed. The same may be said of vessels of any of the common kinds of earthen ware, which being glazed with lead, and the glazing soluble in acids, may be suspected of producing similar effects.

The creaming dishes, or vessels in which the milk is placed for throwing up cream, when properly cleaned, sweet, and cool, are to be filled with the milk as soon after it is drawn from the cow as possible, having been first strained carefully through a close strainer, formed of a large wooden bowl with a hole at the bottom covered with a very close sieve of fine wire (silver wire is best, most durable and cleanly) or hair web, woven for that purpose; or thin cloth of any kind, so as to keep back hairs, &c. that may accidentally fall from the cow. These dishes should never exceed three inches in depth, whatever be their other dimensions; and if the plan recommended above of separating the milk into two parts, and of keeping each cow's milk by itself, be followed, it will be convenient to have them made of such dimensions as to contain about one and a half or two gallons. As soon as they are filled they are to be placed on the shelves in the milk-house, where they should be allowed to remain perfectly undisturbed till it be judged expedient to separate the cream from them, which will depend upon the degree of heat at the time, and the particular views of the owner of the dairy. In a moderately warm temperature if very fine butter be intended, it should not be allowed to stand more than six or eight hours: but for ordinary good butter it may be let alone for twelve hours, or more.

The cream, being carefully separated, must be deposited by itself in a vessel suitable for the purpose, and kept until a sufficient quantity be collected. A firm neat-made wooden barrel, with a lid fitted to it, is probably as well calculated for this use, as any vessel. Its size must depend on that of the dairy.

The length of time which the cream remains in this vessel must depend on circumstances; but it should always be allowed to acquire a certain degree of acidity, without which it cannot be made into butter with facility. With regard to the operation of churning, it is only necessary to say that it should be carefully performed, whatever kind of churn be employed.

The butter when made must be immediately separated from the milk; and being put into a clean shallow dish, the inside of which, if of wood, should be well rubbed with common salt, to prevent the butter from adhering to it, it should be pressed and worked with a flat wooden ladle, or skimming-dish, having a short handle, so as to force out all the milk lodged in the cavities of the mass. When butter has been thus prepared, it is to be preserved by means of common salt when necessity requires it, and kept from being too soft by means of cold water.

Cheese. In the making of cheese many circumstances are to be attended to; such as the preparation of the rennet, the coagulation of the milk, the management of the curd, &c. These operations are differently conducted in different dairies, and different parts of the country. The following is the method of preparing the rennet, and making cheese, which Mr. Marshall employed.

"Take a calf's maw, or stomach; and, having emptied out the curd, wash it and salt it thoroughly, inside and out, leaving a white coat of salt over every part of it. Put it into an earthen jar,

or other vessel, and let it stand three or four days; in which time it will have formed the salt and its own natural juices into a pickle. Take it out of the jar, and hang it up for two or three days to let the pickle drain from it; resalt it; place it again in a jar; cover it tight down with a paper pierced with a large pin; and in this state let it remain for a whole year. It may, however, in case of necessity, be used a few days after it has received the second salting; but it will not be so strong as if kept a longer time.

"Curd of a good quality may be obtained from milk heated from 87. to 103. of Fahrenheit; provided the rennet be so proportioned, that the time of coagulation be from three quarters of an hour to two hours and a half; and provided also the milk be kept properly covered during the process of coagulation. From other trials it should seem, that from 85. to 90. are the proper degrees of heat; and from one to two hours the proper time of coagulation; and that the milk ought to be covered so as to lose in the process about five degrees of its original heat. But climate, season, weather, and pasture, may account for this difference.

"In my dairy, (says Mr. Marshall) the practice has been uniformly this: As soon as the curd is come at the top, firm enough to discharge its whey, the dairy-woman tucks up her sleeves, plunges her hands to the bottom of the vessel, and, with a wooden dish, stirs the curd and whey briskly about: she then lets go the dish, and, by a circular motion of her hands and arms, violently agitates the whole; carefully breaking every part of the curd; and, at intervals, stirs it hard to the bottom with the dish; so that not a piece of curd remains unbroken larger than a hazel nut. This is done to prevent what is called slip-curd (that is, lumps of curd which have slipped unbroken through the dairy-woman's hands), which, by retaining its whey, does not press uniformly with the other curd, but in a few days, (if it happen to be situated toward the rind) turns livid and jelly-like, and soon becomes faulty and rotten. This operation takes about five or ten minutes; or, if the quantity of curd be large, a quarter of an hour. In a few minutes the curd subsides, leaving the whey clear upon the top. The dairy-woman now takes her dish, and lades off the whey into the pail; which she empties into a milk-lead to stand for cream, to be churned for whey butter. This is a practice peculiar to the cheese counties, and forms no inconsiderable part of the profit of a dairy in those counties. Having laved off all the whey she can, without gathering up the small pieces of the loose curd floating near the bottom of the vessel, she spreads a straining-cloth over her cheese-tongs, and strains the whey through it, returning the curd retained in the cloth into the cheese-tub. When she has got all the whey she can, by pressing the curd with her hand and the lading-dish, she takes a knife and cuts it into square pieces, about two or three inches square. This lets out more of the whey, and makes the curd handy to be taken up, in order to be broken into the vats.

"A dairy should be plentifully furnished with vats, and some of them of different sizes; for when three or four cheeses are made at each meal, a number of vats become actually in use; and if there are not still a number empty, the dairy-woman becomes confined in her choice, and cannot proportion exactly her vats to the quantity of curd she happens to find in her cheese-tub; and keeping a little overplus curd from meal to meal frequently spoils a whole cheese.

"Having made choice of a vat or vats, proportioned to the quantity of curd, so that the cheese, when fully pressed, shall neither over nor under fill the vat, she spreads a cheese-cloth loosely over the vat; into which she re-breaks the curd; carefully squeezing every part of it in her hands; and, having filled the vat, heaped up and rounded above its top, folds over the cloth, and places it in the press.

"Much depends on the construction and power of the press. The excellency of construction depends upon its pressing level: if it has too much play, so as to incline and become tottering or leaning one way or another, and do not fall perpendicular upon the cheese-board, one side of a cheese will frequently be thicker than another; and, what is still worse, one side will be thoroughly pressed, while the other is left soft and spungy. Its power may be given by a screw, by a lever, or by a dead weight, and ought to be proportioned to the thickness of the cheese.

"In autumn, when the weather got cool and moist, the curd is scalded, to make the cheese come quicker to hand, (that is, sooner saleable) and to prevent a white woolly coat from rising. It is done thus: If from new milk, scalding water (boiling water with a small quantity of cold whey mixed with it) is poured over the whole surface of the curd as it lies at the bottom of the cheese-tub: if from skimmed or other inferior milk, the outsides only are scalded, after the curd is in the vat, by first pouring the scalding water on one side, and then, turning the cheeseling, pouring it on the other. For if in this case the curd were to be scalded, it would render it hard, and spoil the taste and texture of the cheese. In the scalding the cheeseling, the curd is first put into the bare naked vat, and the upper part scalded: the cheese-cloth is then spread over it, and the vat being turned, the curd falls into the cloth: the curd, with the cloth under it, is then put into the vat; the outer edges pared off; the paring broke, and rounded up in the middle; and the scalding water poured upon it as before; the folds of the cloth laid over, and the vat set in the press.

"The whey being pretty well pressed out, and the cheeseling (whether it has been scalded or not) having got firm enough to handle, which it will be in about half an hour, the dairy-woman takes it out of the vat; washes the cloth in a pail of cold clean water; spreads it over the vat; turns the cheeseling upon it; squeezes it gently into the vat; folds over the cloth; tucks in the corner with a wooden cheese-knife, and replaces the vat in the press.

"Supposing the cheeseling to be made in the morning, it now remains in the press, untouched, until the evening; when it is taken out, salted, put into a fresh dry cloth, and left in the press all night.

"The method of salting is this: The salt being well bruised, and the lumps thoroughly broken, it is spread plentifully on each side of the cheeseling, so as wholly to cover it, about one tenth of an inch in thickness, more or less, in proportion to the thickness of the cheese. If this be of a considerable thickness, as suppose three inches and upwards, some salt is put into

the middle of it, by stopping when the vat is half filled with curd, strewing on the salt, and on this putting the remainder of the curd.

"Next morning, if the curd be rich, or has been cold-run, the cheeseling is turned into another dry cloth, and left in the press till evening: but if on the contrary the curd be from poor milk, or from milk which before setting had acquired any degree of sourness, or if it has been run hot and quick, the cheeseling should in the morning be bare-vatted; that is, be put into the vat without a cloth round it, and be put again into the press until evening.

The use of bare-vatting is to take out the marks of the cloth, and thereby evade a waste of labour in bringing the cheese to a smooth glossy coat. The reason for the above distinction is, therefore, obvious; for, the harder the curd, the longer the marks of the cloth are in pressing out.

"In the evening, that which was turned into the dry cloth in the morning, is now bare-vatted; and that which was bare-vatted in the morning, is now turned in the vat; and, having stood in the press until morning, the process is finished. The cheeses are taken out of the vats, and placed upon the shelf."

Cream cheeses are made, by adding the cream of one meal's milk, to milk which comes immediately from the cow: these are pressed gently two or three times, turned for a few days, and are then fit for use.

Cheeses are of various kinds and qualities; but that which comes as near perfection as art can probably approach, is of a close even contexture; of a firm but unctuous consistency; of a mild flavour, while young; acquiring, by age, an agreeable fragrance. If a cheese of this quality be ironed, it has somewhat the appearance of firm butter; or of wax moderately warmed. If the plug be gently rubbed, the substance of the cheese seems to melt under the finger, which wears it down as it would fine clay duly moistened. If the end of the plug be pinched, it yields to the pressure without crumbling; grinding down, between the fingers, to an impalpable matter. Cheese of this description, improves, by age, in mellowness and flavour.

The following is Mr. Pryce's account of Signor Vitalbni's process of making *Parmesan cheese.* At ten o'clock in the morning, five brents and a half of milk, each brent being about forty-eight quarts, are put into a large copper, which turns on a crane, over a slow wood fire, made about two feet below the surface of the ground. The milk is stirred from time to time; and, about eleven o'clock, when just luke-warm or considerably under a blood-heat, a ball of rennet, as big as a large walnut, is squeezed through a cloth into the milk, which is still kept stirring. The mode of making this rennet is pretended to be a profound secret; but it appeared to Mr. Pryce, to resemble our own rennet, mixed up with salt and vinegar, and the addition of a little old cheese. By the help of the crane, the copper is turned from over the fire, and let stand till a few minutes past twelve; at which time the rennet has sufficiently operated. It is now stirred up, and again left to stand a short time, for the whey to separate a little from the curd. Part of the whey is then taken out, and the copper again turned over a fire sufficiently brisk to give a strong heat, but below that of boiling. A quarter of an ounce of saffron is now put in, to give it a little colour; but not so unnaturally high as some cheeses in England are coloured; and it is well stirred from time to time. The dairy-man frequently feels the curd; and when the small, and, as it were, granulated parts feel rather firm, which is in about an hour and a half, the copper is taken from the fire, and the curd left to fall to the bottom. Part of the whey is taken out, and the curd brought up in a coarse cloth, hanging together in a tough state. It is then put into a hoop, with about a half-hundred weight laid upon it, for about an hour; after which the cloth is taken off, and the cheese placed on a shelf in the same hoop. At the end of two or three days, it is sprinkled all over with salt; and the same is repeated every second day, for about forty or forty-five days; after which no further attention is required. Whilst salting, two cheeses are generally placed one upon another; in which state they are said to take the salt better than singly.

Sheep.—This kind of stock is highly advantageous, both as supplying food and clothing, and as a mean of improving the farm: and hence in breeding these animals, attention must be had to both these circumstances. The sheep of different counties excel in these different properties, and in some parts they have been lately much improved by crossing the breeds. Mr. Kent in his Survey of Norfolk, observes, that there ought always to be some affinity or similitude between the animals which are crossed. It is a manifest incongruity, says he, to match a Norfolk and a Leicester sheep; or a South Down and a Norfolk; or any long-woolled sheep with a short-woolled; but a Leicestershire sheep may be matched, with some degree of propriety, with a Cotswold; and a South Down sheep with a Berkshire or a Herefordshire Ryland.

The best sort of sheep for fine wool, are those bred in Herefordshire and Worcestershire; but they are small and black-faced, and consequently bear but a trivial quantity. Warwick, Leicester, Buckingham, and Northamptonshire, breed a large-boned sheep, of the best shape, and deepest wool. The marshes of Lincolnshire also breed a very large kind of sheep, but their wool is not so good.

The northern counties in general breed sheep with long, but hairy wool: and Wales breeds a small hardy kind of sheep, which has the best tasted flesh, but the worst wool of all.

The farmer should always buy his sheep from a worse land than his own; they should be big-boned, and have a long greasy wool curling close and well. These sheep always breed the finest wool, and are also the most approved by the butcher.

The Leicestershire breeds are of two kinds, the old and the new. The old Leicesters are well known, as large, thick, heavy sheep, with long combining wool: the new Leicester breed is a refinement upon the old, by crossing with a finer-boned and finer-woolled ram. These are now established in various parts of Staffordshire, and increasing in other places. The old Leicester breeds are crossing with the new, which bids fair to produce a very good breed; there being many instances in which the old breed were become too coarse, and the new too fine.

Almost the whole of the sheep kept on the upland farms of East Kent, are the true Romney

marsh breed; whose carcases and bones being large, and wool long and heavy, require rich land and good keep to make them fat.

In the Isle of Sheppey, the sheep are also of the Romney marsh sort, true Kents: but the soil being much inferior to Romney marsh, the sheep are somewhat smaller; and, from the same cause, their wool is lighter and finer. Some graziers get rams from Romney marsh; others prefer their own sort; and but very few, if any, pay that attention which it is their interest to do, to the wool of the rams they use. The wethers are fattened at three years old, then weighing from twenty to twenty-four pounds per quarter.

The sheep mostly kept in the district of West Kent, are the South-Down sort, bought-in wether lambs, at the autumnal fairs on the Downs, chiefly at Lewes. They are kept the first winter on stubble land, with grass and a few turnips, and on grass and seeds in summer; and frequently are fattened on turnips the next winter, before they are quite two years old: this is become the favourite sort within these few years, and increases annually in this district. The other sorts of sheep kept there, are the West Country, from Wiltshire and Dorsetshire; the wethers are bought-in at all ages, to be fattened on turnips. But there are hardly any sheep bred in the Weald of Kent, excepting a few for early fat lambs, of the Wiltshire and South-Down sorts.

Some of the Wiltshire wethers are bought-in to fatten on turnips; and a few South-Down wether-lambs are bought in the autumn, and kept on the driest parts until they are two years old, and then made fat for sale on turnips or meadow-lands.

The system of management in Romney marsh is the following: The rams are usually put to the ewes, allowing one to forty or fifty, and sometimes sixty, from the twelfth to the sixteenth of November, and allowed to stay with them about five weeks. The ewes live entirely on the grass, without any hay, during the winter: in deep snow they scrape with their feet, and obtain a subsistence, although they then lose flesh, and sometimes become very poor by their yeaning-time. This marsh produces many twins; but a great number are lost: so that most graziers consider their crop not a bad one, if they wean as many lambs as they put ewes to ram. The lambs are weaned the first or second week in August, and very soon after put out to keep to the upland farmers of the county, where they remain till the fifth of April, at from 2s. to 3s. per score, per week. When they return to the marsh, they are put on the poorest land, or such fields as the grazier thinks want improvement by hard stocking; which is there called tegging a field, and is held to be of great service. These young sheep are placed in the fields in proportion to what it is judged each will maintain, from the fifth of April until August, which is at the rate of from four to eight per acre. The wether-tegs in the autumn are removed to the fatting, and the ewe-tegs to the breeding grounds, among the two and three yearling ewes. The wethers remain till July or August following, when, as they become fat, they are drawn out and sold to the butchers at the marsh markets, or are sent to Smithfield. The two yearling wethers, when fat, at this season weigh from twenty to twenty-eight pounds per quarter; and some of the largest and best fed, a few pounds more. The old ewes, there called barrens, are put to fattening as soon as their milk is dried after the third lamb, which is at the age of four years, on some of the best land; where they are placed from two to three per acre for the winter. These, in favourable winters, are sometimes made fat, and sold in the spring, soon enough for the same field to take in a fresh set of wethers, and make them fat by the autumn; but this can only be done by light stocking.

The practice of fattening sheep on turnips, assisted by oil-cake, corn, hay, sainfoin, &c. is greatly in use among the upland farmers of this county; not so much for the profit by feeding with those articles, as for the great improvement of the soil where the turnips are fed off. The manure from sheep fed on oil-cake and turnips, is reckoned very enriching to the land. A great number of fold-flocks of lean sheep are kept by the farmers of the eastern part of the county, of from eight to twenty score in number. These are each attended by a shepherd, who removes the fold every morning to fresh ground, at six o'clock in summer, and at break of day in winter: the flock is then driven away to the worst keep at the first part of the morning, and is returned into the fold for two or three hours in the middle of the day, while the shepherd goes to dinner: in the afternoon it is gradually led to the best keep on the farm, that the sheep may return full fed to the fold in the evening. Great caution is necessary in feeding sheep on clover in summer, and on turnips in the first part of the winter.

For the purposes of *wool*, it is highly probable that the Merinos, so abundantly introduced into this country from Spain a short time since, and so liberally and usefully distributed by his majesty, may be found highly advantageous; but there has not yet been time enough to make the experiment how far they may become naturalized to our climate, without having their wool deteriorated; a fact that we have sufficient reason to believe often follows on a change of climate, although this has been denied by some physiologists.

If such deterioration should not take place we should earnestly recommend to the growers of wool a large importation of Cape sheep, the fleece of which is in every respect as fine as the finest of the Merinos, and the flesh of which would perhaps be found a more valuable product. The stock which is now so abundant in New South Wales was derived from this quarter: and the writer of this article has seen cloth manufactured of this wool without any intermixture of other wool, and by no means selected for the purpose, finer than the finest French broad cloths, and very durable.

The diseases to which sheep are subject are the following: rot, red-water, foot-rot and hoving, scab, dunt, rickets, fly-struck, flux, and bursting. Of each of these we shall give the best description in our power, with the most approved remedies.

1. The rot, which is a very pernicious disease, has of late engaged the attention of scientific farmers. But neither its nature nor its cause has yet been fully ascertained. Some have supposed the rot owing to the quick growth of grass or herbs that grow in wet places. Without premising that all-bounteous Providence has given to every animal its peculiar taste, by which it distinguishes the food proper for its preservation and support, if not vitiated by fortuitous circum-

stances, it seeems very difficult to discover on philosophical principles, why the quick growth of grass should render it noxious, or why any herb should at one season produce fatal effects, by the admission of pure water only into its component parts, which at other times is perfectly innocent, although brought to its utmost strength and maturity by the genial influence of the sun. Besides, the constant practice of most farmers in the kingdom, who with the greatest security feed their meadows in the spring, when the grass shoots quick and is full of juices, militates directly against this opinion.

Mr. Arthur Young, to whom agriculture is much indebted, ascribes this disease to moisture. In confirmation of this opinion, which has been generally adopted, we are informed, in the Bath Society's papers, Vol. VII. art. xlvi. by a correspondent, that there was a paddock adjoining to his park which had for several years caused the rot in most of the sheep which were put into it. In 1769 he drained it, and from that time his sheep were free from this malady. But there are facts which render it doubtful that moisture is the sole cause We are told, the dry limed land in Derbyshire will produce the rot as well as water meadows and stagnant marshes; and in some wet grounds sheep sustain no injury for many weeks.

Without attempting to enumerate other hypotheses which the ingenious have formed on this subject, we shall pursue a different method, in order to discover the cause. On dissecting sheep that die of this disorder, a great number of insects called flukes (*fasciolæ*) are found in the liver. That these flukes are the cause of the rot, therefore, is evident: but to explain how they come into the liver is not so easy. It is probable that they are swallowed by the sheep along with their food while in the egg state. The eggs deposited in the tender germ are conveyed with the food into the stomach and intestines of the animals, whence they are received into the lacteal vessels, carried off in the chyle, and pass into the blood; nor do they meet with any obstruction until they arrive at the capillary vessels of the liver. Here, as the blood filtrates through the extreme branches, answering to those of the vena portæ in the human body, the secerning vessels are too minute to admit the impregnated ova, which, adhering to the membrane, produce those animalcules that feed upon the liver and destroy the sheep. They much resemble the flat fish called plaise; are sometimes as large as a silver two pence, and are found both in the liver and in the gall-duct which conveys the bile from the liver to the duodenum or lower intestines.

The common and most obvious objection to that opinion is, that this insect is never found but in the liver, or in some parts of the viscera of sheep that are diseased more or less; and that they must therefore be bred there. But this objection will lose its force, when we consider that many insects undergo several changes, and exist under forms extremely different from each other. Some of them may therefore appear and be well known under one shape, and not known to be the same under a second or third. The fluke may be the last state of some aquatic insect which we at present very well know under one or other of its previous forms.

If this be admitted, it is easy to conceive that sheep may, on wet grounds especially, take multitudes of these ova or eggs in with their food; and that the stomach and viscera of the sheep being a proper nidus for them, they of course hatch, and appearing in their fluke or last state, feed on the liver of the animal, and occasion this disorder.

It is a singular fact, "that no ewe ever has the rot while she has a lamb by her side." The reason of this may be, that the impregnated ovum passes into the milk, and never arrives at the liver. The rot is fatal to sheep, hares, and rabbits, and sometimes to calves; but never infests animals of a larger size.

Miller says that parsley is a good remedy for the rot in sheep. Perhaps a strong decoction of this plant, or the oil extracted from its seeds, might be of service. Salt is also a useful remedy. It seems to be an acknowledged fact, that salt marshes never produce the rot. Salt indeed is pernicious to most insects. Common salt and water expel worms from the human body; and sea-weed if laid in a garden will drive away insects; but if the salt be separated by steeping it in the purest spring-water for a few days, it abounds with animalcules of various species.

Lisle in his book of husbandry, informs us of a farmer who cured his whole flock of the rot by giving each sheep a handful of Spanish salt for five or six mornings successively. The hint was probably taken from the Spaniards, who frequently give their sheep salt to keep them healthy. On some farms perhaps the utmost caution cannot always prevent this disorder. In wet and warm seasons the prudent farmer will remove his sheep from the lands liable to rot. Those who have it not in their power to do this may give each sheep a spoonful of common salt, with the same quantity of flour, in a quarter of a pint of water, once or twice a-week. When the rot is recently taken, the same remedy given four or five mornings successively will, in all probability, effect a cure. The addition of flour and water (in the opinion of Mr. Price of Salisbury, to whose excellent paper in the Bath Society's Transactions, we own ourselves much indebted) will not only abate the pungency of the salt, but dispose it to mix with the chyle in a more gentle and efficacious manner.

A farmer of a considerable lordship in Bohemia visiting the hot-wells of Carlsbad, related how he preserved his flocks of sheep from the mortal distemper which raged in the wet year 1769, in which so many perished. His preservative was very simple and very cheap: "He fed them every night, when turned under a shed, cover, or stables, with hashed fodder straw; and, by eating it greedily, they all escaped."

2. *Red-water* is a disorder most prevalent on wet grounds. I have heard (says Mr. Arthur Young) that it has sometimes been cured by tapping, as for a dropsy. This operation is done on one side of the belly towards the flank, just below the wool.

3. The *foot-rot* and *hoving*, which is very common on low fenny grounds, is cured by keeping the part clean, and lying at rest in a dry pasture.

4. The *scab* is a cutaneous disease, owing to an impurity of the blood, and is most prevalent in wet lands or in rainy seasons. It is cured by tobacco-water, brimstone and alum, boiled together, and then rubbed over the sheep. If only partial, tar and grease may be sufficient. But the simplest and most efficacious remedy for this disease was communicated to the Society for the

Encouragement of Arts, &c. by Sir Joseph Banks, and is as follows:

"Take one pound of quicksilver, half a pound of Venice turpentine, half a pint of oil of turpentine, and four pounds of hog's-lard. Let them be rubbed in a mortar till the quicksilver is thoroughly incorporated with the other ingredients; for the proper mode of doing which, it may be proper to take the advice, or even the assistance, of some apothecary or other person used to make such mixtures."

The method of using the ointment is this: beginning at the head of the sheep, and proceeding from between the ears along the back to the end of the tail, the wool is to be divided in a furrow till the skin can be touched; and as the furrow is made, the finger slightly dipped in the ointment is to be drawn along the bottom of it, where it will leave a blue stain on the skin and adjoining wool: from this furrow similar ones must be drawn down the shoulders and thighs to the legs, as far as they are woolly; and if the animal is much infected, two more should be drawn along each side parallel to that on the back, and one down each side between the fore and hind legs.

Immediately after being dressed, it is usual to turn the sheep among other stock, without any fear of the infection being communicated; and there is scarcely an instance of a sheep suffering any injury from the application. In a few days the blotches dry up, the itching ceases, and the animal is completely cured: it is generally, however, thought proper not to delay the operation beyond Michaelmas.

5. The *hippobosca ovina*, called in Lincolnshire *sheep-fagg*, an animal well known to all shepherds, which lives among the wool, and is hurtful to the thriving of sheep, both by the pain its bite occasions and the blood it sucks, is destroyed by this application, and the wool is not at all injured. Our wool-buyers purchase the fleeces on which the stain of the ointment is visible, rather in preference to others, from an opinion that the use of it having preserved the animal from being vexed either with the scab or faggs, the wool is less liable to the defects of joints or knots; a fault observed to proceed from every sudden stop in the thriving of the animal, either from want of food or from disease.

This mode of curing was brought into that part of Lincolnshire where Sir John's property is situated, about twelve years ago, by Mr. Stephenson, of Mareham, and is now so generally received, that the scab, which used to be the terror of the farmers, and which frequently deterred the more careful of them from taking the advantage of pasturing their sheep in the fertile and extensive commons with which that district abounds, is no longer regarded with any apprehension: by far the most of them have their flock anointed in autumn, when they return from the common, whether they show any symptoms of scab or not; and having done so, conclude them safe for some time from either giving or receiving infection. There are people who employ themselves in the business, and contract to anoint our large sheep at five shillings a score, insuring for that price the success of the operation; that is, agreeing, in case many of the sheep break out afresh, to repeat the operation gratis, even some months afterwards.

6. The *dunt*, or *gid*, is a distemper caused by a bladder of water, or hydatid, in the head. No cure for this has yet been discovered (See GID).

7. The *rickets* is an hereditary disease, for which no antidote is known. The first symptom is a kind of lightheadedness, which makes the affected sheep appear wilder than usual when the shepherd or any person approaches him. He bounces up suddenly from his lare, and runs to a distance, as though he were pursued by dogs. In the second stage, the principal symptom is the sheep's rubbing himself against trees, &c. with such fury as to pull off his wool and tear away his flesh. The distressed animal has now a violent itching in his skin, the effect of an highly inflamed blood; but it does not appear that there is ever any cutaneous eruption or salutary critical discharge. In short, from all circumstances, the fever appears now to be at its height. The last stage of this disease seems only to be the progress of dissolution, after an unfavourable crisis. The poor animal, as condemned by nature, appears stupid, walks irregularly (whence probably the name of rickets), generally lies, and eats little: these symptoms increase in degree till death, which follows a general consumption, as appears upon dissection of the carcass, the juices and even solids having suffered a general dissolution.

In order to discover the seat and nature of this disease, sheep that die of it ought to be dissected. This is said to have been done by one gentleman, Mr. Beal; and he found in the brain, or membranes adjoining, a maggot, about a quarter of an inch long, and of a brownish colour. A few experiments might easily determine this fact.

8. The *fly-struck* is cured by clipping the wool off as far as infected, and rubbing the parts dry with lime or wood-ashes: curriers' oil will heal the wounds, and prevent their being struck any more; or they may be cured with care without clipping, with oil of turpentine, which will kill all the vermin as far as it reaches; but the former is the surest way.

9. The *flux* is another disease to which sheep are subject. The best remedy is said to be, to house the sheep immediately when this distemper appears, to keep them very warm, and feed them on dry hay, giving them frequent glisters of warm milk and water. The cause of the distemper is either their feeding on wet lands, or on grass that is become mossy by the lands having been fed many years without being ploughed. When the farmer perceives his sheep-walks to become mossy, or to produce bad grass, he should either plough or manure with hot lime, making kilns either very near or in the sheep-walks, because the hotter the lime is put on, the sweeter the grass comes up, and that early in the year.

10. *Bursting*, or as it is called in some places, the *blast*, attacks sheep when driven into fresh grass or young clover. They overeat themselves, foam at the mouth, swell exceedingly, breathe very quick and short, then jump up, and instantly fall down dead. In this case, the only chance of saving their life is by stabbing them in the maw with an instrument made for the purpose. The instrument is a hollow tube, with a pointed weapon passing through it. A hole is made with a pointed weapon; which is immediately withdrawn, and the hole is kept open by inserting the tube till the wind is discharged.

11. Sheep are infested with worms in the nose, called *œstrus ovis*, and produced from the egg of a large two-winged fly. The frontal sinuses above

the nose in sheep and other animals, are the places where these worms live and attain their full growth. These sinuses are always full of a soft white matter, which furnishes these worms with a proper nourishment, and are sufficiently large for their habitation; and when they have here acquired their destined growth, in which they are fit to undergo their changes for the fly state, they leave their old habitation, and falling to the earth, bury themselves there; and when these are hatched into flies, the female, when she has been impregnated by the male, knows that the nose of a sheep or other animal is the only place for her to deposit her eggs, in order to their coming to maturity. M. Vallisnieri, to whom the world owes so many discoveries in the insect class, is the first who has given any true account of the origin of these worms. But though their true history had been till that time unknown, the creatures themselves were very early discovered, and many ages since were esteemed a good medicine in epilepsies.

The fly produced from this worm has all the time of its life a very lazy disposition, and does not like to make any use either of its legs or wings. Its head and corselet together are about as long as its body, which is composed of five rings, streaked on the back; a pale yellow and brown are there disposed in irregular spots; the belly is of the same colours, but they are there more regularly disposed, for the brown here makes three lines, one in the middle, and one on each side, and all the intermediate spaces are yellow. The wings are nearly of the same length with the body, and are a little inclined in their position, so as to lie upon the body: they do not, however, cover it; but a naked space is left between them. The ailerons, or petty wings which are found under each of the wings, are of a whitish colour, and perfectly cover the balancers, so that they are not to be seen without lifting up the latter.

The fly will live two months after it is first produced, but will take no nourishment of any kind; and possibly it may be of the same nature with the butterflies, which never take any food during the whole time of their living in that state, as Reaumur asserts.

Swine. In general, those kind of hogs which are the best for feeding, are wide made, plump, and round in the carcass, light of bone, with short legs and soft hair.

In Staffordshire hogs of the large breed have been fatted to from six hundred to eight hundred pounds weight, exclusive of the entrails; but as these require much time and food, they have pretty generally given way to a smaller sized, finer boned, thick, plump animal. Hogs are generally fatted by the farmers of this county with the refuse of the dairy, boiled potatoes, barley meal, and peas either whole or ground: by the millers, with what they call *sharps* and *gurgeons*, that is, the husk or bran of wheat ground down, but not wholly divested of its flour; also with other sorts of grain and pulse ground down: by the butchers, with the refuse or offal of slaughtered animals. The best way of managing potatoes is to boil them in their own steam, and to put them afterwards into a large oven when the bread is drawn, to evaporate the watery parts; they will then go nearly as far as chestnuts or acorns in feeding.

The boar, or male, is chosen with great care, when intended for the propagation of his species; and is thus employed from the age of two to five years, and then either sold or fatted. The males not allotted to this use are castrated, sometimes at the age of six weeks, and sometimes when they are six months old; and then fed to a great size either for sale or for the use of the family. Sows are kept for breed generally from one year old to seven, and are then spayed and fatted. They have commonly more grease on their intestines than hogs, these being fattest on their backs.

As to the age of these animals, it is said that the life of the wild boar may be extended to twenty-five or thirty years. Aristotle observes, that hogs in general live twenty years; and adds, that both males and females are fertile till they arrive at the age of fifteen. They can engender at the age of nine or twelve months; but it is better to restrain them till they be eighteen months or two years. The first litter of the sow is not numerous; and when only one year old, her pigs are weak, and even imperfect. She may be said to be in season at all times. Though full, she solicits the approach of the male. This may be regarded as an excess among animals; for almost every other species refuses the male after conception. The ardour of the sow, though almost perpetual, is however marked by paroxysms and immoderate movements, which always terminate by her wallowing in the mire. She at the same time, emits a thick whitish fluid. She goes four months with young, brings forth in the beginning of the fifth, and soon after solicits the male; is impregnated a second time, and of course brings forth twice a year. The wild sow, which every way resembles the domestic kind, produces only once a year. This difference in fertility is probably owing to want of nourishment, and the necessity of suckling her pigs much longer than the domestic sow, which is never allowed to nurse her young above fifteen days or three weeks. Only eight or nine of the litter are kept longer; the rest are sold. In fifteen days, pigs are excellent food.

As these creatures, though exceedingly voracious, will feed almost on any thing, they are bred and kept every where, and are quickly and cheaply fatted. In miry and in marshy grounds (to which they are not averse) they devour worms, frogs, fern, rush, and sedge roots. In drier and in woody countries, they feed on hips, haws, sloes, crabs, mast, chestnuts, acorns, &c. and on this food they will grow fleshy and fat: They are a kind of natural scavengers, will thrive on the trash of an orchard, the outcasts of the kitchen, the sweepings of barns and granaries, the offals of a market, and most richly on the refuse of a dairy. If near the sea, they will search the shores for shell-fish; in the fields, they eat grass; and in cities and large towns, they are kept in great numbers, and supported chiefly by grains. It is evident that the facility of feeding them every where at a small expense, is a national benefit, more especially in a country where the people are much accustomed to eat flesh. It is no less observable, that notwithstanding this facility of feeding, and the multitudes of swine maintained, they seldom fail of coming to a good market. In no part of Europe is the management of these creatures better understood than in Britain. The time of farrowing is adjusted to the nature of the farm, the food it can supply, and the number of pigs sold and kept are in like manner adjusted. New

kinds of food, more wholesome and nutritive than what were used formerly, have been introduced; such as turnips, carrots, clover, &c. They are in most places regularly managed and closely attended. Tusser many years since affirmed, from his own experience, that a sow might bring as much profit as a cow. In some counties, it is said, a sow dependent on a dairy has produced, all expences deducted, about 10l. in the space of a year. In Britain, these animals in different counties are of very different sizes. In Leicestershire, Northamptonshire, and Pembrokeshire, they are very large. In Hampshire, Wiltshire, and wherever they can run in the woods, and feed on mast and acorns, their flesh is firmer and better. The Chinese swine are common with us; they are smaller, blacker, and their legs shorter than ours; so that, when fat, their bellies literally touch the ground. They thrive exceedingly well with us, are very prolific, and their flesh very fine and well-tasted.

In considering the advantages derived from these creatures, it is to be observed, that the flesh of all the different kinds, and at all ages, is looked upon as a very substantial and agreeable aliment: and of course, in their proper seasons, the different sorts of provisions thus supplied are all of them very saleable. The wild boar was esteemed a prime delicacy amongst the Romans, and the flesh of the tame was much more in favour with our ancestors than with us; though brawn has still many admirers, is made in the greatest perfection, and considered as a rarity peculiar to this country. Pork, though it might be wisely prohibited in some warm countries, is found by experience equally nutritive and salutary here. As such it furnishes a very large proportion of that food which is vended in our markets. It takes salt better, and keeps longer, than the flesh of any other animal; and the consumption of it is prodigious when pickled or salted, more especially in our foreign garrisons and in the sea-service. Our bacon is differently cured, so as to render it acceptable to all palates; and our hams are not at all inferior to those of other countries. Fresh pork sells nearly as dear as beef; the lard brings very nearly the same price; the blood, the intestines, the feet, and the tongue, are all prepared as food. The fat of the intestines and web, which differs from common land, is employed for greasing axles of wheels, and for many other purposes. Sieves are made of this skin; and brushes, pencils, &c. of the bristles. The dung is reputed next in value to that of sheep. Mr. Worlidge proposes that swine should be turned into a close well-paled, and planted with greens, pulse, and roots, on which they may feed, and by their trampling and their dung raise a great quantity of excellent soil. Mr. Mortimer assures us that some, on poor light shallow land in Staffordshire, sow a small white pea, which they never reap, but turn in so many hogs to eat them as they think they will fatten; and this chiefly for the purpose of their dung.

Poultry. Under this head we shall comprehend domestic fowls, ducks, geese, turkies, and pigeons.

Fowls. The farm-yard cannot be said to be complete until well stocked with this species; the advantage of which will be most considerable in situations where the farmer is best supplied with grain, and has the best means of preserving the stock. In choosing this kind, it is necessary to prefer the best breeders and the best layers; the oldest being always reckoned the best sitters, and the youngest the best layers; but no sort will be good for either purpose if they be kept too fat. The best age to set a hen for chickens, is two years old, and the best month is February; though any month between that and Michaelmas is good. Hens sit twenty-one days, during which time they should constantly have meat and drink near them, that they may not straggle from their eggs, and thereby chill them. If fowls be fed with buck or French wheat, or with hemp-seed, it is said they will lay more eggs than ordinary; and buck-wheat, either whole or ground, made into paste, which is the best way, is a grain that will fatten fowls very speedily; but the common food is barley meal, with milk or water, though wheat-flour moistened is probably the best. A good hen should be working, vigilant and laborious, both for herself and her chickens, and the larger the better. The elder hens are rather to be chosen for hatching than the younger, because they are more constant, and will sit out their time; but if you choose for laying, take the youngest. Those eggs that are laid when the hens are a year and a half, or two years old, are the best; at that time you must give the hens plenty of victuals, and sometimes oats, with fenugreek to heat them, if you would have large eggs.

In setting hens, take care that the eggs be new, which may be known by their being heavy, full and clear: and while sitting, a hen should not be taken off or disturbed from her nest, for that will make her utterly forsake it.

The hen-house should be large and spacious, with a pretty high roof and strong walls, in order to keep out thieves and vermin; there should likewise be windows on the east side, that the fowls may enjoy the benefit of the rising sun. Round about the inside of the walls, upon the ground, should be made large pens of three feet high, for geese, ducks, and large fowls to sit in; and near the covering of the house long perches, reaching from one side of the house to the other, should be fixed, on which cocks, hens, capons and turkeys may sit at pleasure. At another side of the house, in the darkest part of the ground pens, fix hampers full of straw for nests, that hens may here lay their eggs; but when they sit to hatch chickens, they should be on the ground: there should likewise be stakes stuck in the walls, that the poultry may climb to their perches with the greater ease; and the floor should not be paved, but made of earth smooth and easy. The smaller fowls should also have a hole made at one end of the house, to go in and come out at when they please, or else they will seek out roosts in other places. It would likewise be of great advantage to have the hen-house situated near some kitchen, brew-house, bake-house, or kiln, where it may have the heat of the fire, and be perfumed with smoke, which is very grateful to pullets.

In order to fatten chickens, put them into coops, and feed them with barley-meal; put likewise a small quantity of brick-dust into their water, which they ought never to be without: this last will give them an appetite to their meat, and fatten them very soon; for in this case it must be considered, that all fowls and birds have two stomachs, as they may be called; the one is their crop, that softens their food, and the other the gizzard, that macerates it: in the last we

always find small stones and sharp sand, which help to do that office, and without these or something of the kind, a fowl will be wanting in its appetite to eat; for the gizzard cannot otherwise masticate, or, as it may be said, grind the food fast enough to discharge it from the crop: and in this business the brick-dust assists them.

This kind of stock is liable to be affected with various disorders; the chief are, the pip, the roup, the flux, stoppage in the bowels, and sore eyes.

The first is occasioned by eating foul meat, and drinking dirty water, and is known by the fowl having a thin white scale on the tip of the tongue. The remedy consists in a removal of the scale, and slightly rubbing the part with salt.

The second is merely a swelling on the rump, which is known by the feathers of the affected part standing out in an unnatural manner. The cure is to be attempted by opening the sore, and forcing out the core after the feathers have been plucked away.

The flux is occasioned by eating too much moist food, and is to be removed by an opposite kind of diet.

The removal of the disorder in the eyes of this kind of fowls, must be attempted by changing their situation and food.

Ducks. These are very valuable for the farm-yard of the husbandman, as they require no charge in keeping, but live on lost corn, worms, snails, &c. for which last reason they are also very good in gardens. Once in a year they lay very well, especially that sort of duck that turns up the bill more than the common kind; and when they sit they need little attendance, except to let them have a little barley, or offal corn and water near them, that they may not straggle far from their nest, and thereby chill their eggs. In general it is found more profitable to set a hen upon the duck's eggs, than any kind of duck whatever, because the old one leads them when hatched too soon into the water, where, if the weather be not very mild, some will be lost. But by means of the hen, they remain a good while upon the land, and get hardy before they venture into the water. About thirteen eggs is the proper number to let a duck sit upon. When the ducklings are hatched, they require no care, if the weather be tolerably good; but if they happen to be produced in a very rainy season, it is right to keep them under cover a little, especially in the night; for, though the duck naturally loves water, it requires the assistance of its feathers, and, till these grow, it is easily hurt by the wet.

It may here be observed, that the fattening of ducks at any age is very easy; and that, whether it be the duckling, or the grown duck, the method to be used is exactly the same. They must be put in a quiet dark place, and kept in a pen, with plenty of corn and water: any kind of corn will do; and with this single direction they will fatten themselves extremely well in fifteen or twenty days.

Geese. These are advantageous both for food, feathers, and grease. They will live upon commons, or any sort of pasture, and need little care and attendance, only that they have plenty of water. The largest geese are reckoned the best; but there is a sort of Spanish geese that are much better layers and breeders than the English, especially if their eggs be hatched under an English goose. Geese in general lay in the spring, the earlier the better, because of their price and of their having a second brood. They commonly lay twelve or sixteen eggs each. You may know when they will lay, by their carrying straw in their mouths, and when they will sit, by their continuing on their nest after they have laid. A goose sits thirty days; but if the weather be fair and warm, she will hatch three or four days sooner. After the goslings are hatched, some keep them in the house ten or twelve days, and feed them with curds, barley-meal, bran, &c. After they have got a little strength, let them out three or four hours in a day, and take them in again, till they are large enough to defend themselves from vermin.

To fatten green geese, they should be shut up when they are about a month old; they will then be fat in about a month longer. The fattening of older geese is commonly done when they are about six months old, in or after harvest, when they have been in the stubble fields, upon which food some kill them; but those who have a mind to have them very fat, shut them up for a fortnight or three weeks, and feed them with oats, splitted beans, barley meal, or ground malt mixed with milk: the best thing to fatten them with, is, however, probably malt mixed with beer. Geese will likewise feed on and fatten well with carrots, when cut small.

In some countries, geese are shorn for their feathers, and in others the feathers are pulled once or twice a year; but the latter way is the more injurious to them.

Turkeys. These prosper very well in open countries, where there is not much shelter to harbour vermin to destroy them, as they are naturally inclined to ramble. The hens are so negligent of their young, that, while they have one to follow them, they never take any heed of the rest; and therefore great care must be taken of the young, especially as they cannot bear the cold.

When kept with corn, they are very great feeders; but if left to their liberty when grown up, they will get their own living, without either trouble or expence, by feeding on herbs, seeds, &c. Turkeys being very apt to straggle, will often lay their eggs in secret places; on which account also they ought to be carefully watched, and made to lay at home. They begin to lay in March, and will sit in April. Eleven or thirteen eggs are the most they sit on. They hatch in between twenty-five and thirty days. The young may be fed either with curds or green fresh cheese cut in small pieces. Their drink may be new milk, or milk and water. Some give them oatmeal and milk boiled thick together, into which they put wormwood chopped small, and sometimes eggs boiled hard, and cut in little pieces. They must be fed often, as the hen is so careless of them herself; and when they have got some strength, feed them abroad in a close walled place where they cannot stray; they must not be let out till the dew is off the grass, nor suffered to be abroad after it begins to fall.

In the fattening of turkeys, sodden barley, or sodden oats, is very excellent for the first fortnight; for another fortnight, it may be necessary to cram them after the manner of capons.

Pigeons. These can hardly, in a general view, be considered as an article of profit to the occupier of a farm; though there are instances in Staffordshire, where something handsome is made of them by tenants, yet the instances are rare, and too seldom occur to be reckoned upon in a general account. Few farm houses indeed are

furnished with the necessary accommodations for them; and the increase of pigeons beyond a certain degree must doubtless be injurious to the cultivation of grain. They are particularly voracious in early peas; and hence the economical farmer can have no wish to see them much increased, conceiving the advantage arising from their increased numbers, for consumption as food, to be more than counterbalanced by the mischief occasioned by their depredations. On this account pigeons are much fewer in Norfolk than formerly, many of the pigeon-houses having been also dropt, on account of the injury which the pigeons do to thatched buildings.

BEES. These very industrious and useful insects have a classical claim to constitute part of the live-stock of a farm. As, however, under the article BEE, we have entered at large into their physiology, the best means of breeding and of preserving them; we shall only detain the reader in the present place, by a few practical observations upon the advantages of possessing an apiary, and the easiest mode of accomplishing this object.

Whoever undertakes to be a successful rearer of bees, must be attentive to provide for his growing republic abundance of such blossoms as they are fondest of, to preserve them from cold during the winter, and from famine and theft by marauding bees, during the spring.

Mr. Bonner calculates, that by a little management, a hundred well-chosen stock-hives may, in a tolerably good season, be made to produce two hundred or two hundred and twenty hives. He calculates, that Scotland alone might easily maintain a million of stock-hives, and hence produce annually four millions of pints of spare honey, and one million of pounds of wax; whence the breed of bees might be rendered a matter of high consequence in a commercial view, independently of its affording employment to hundreds of old people and children engaged in watching them in swarming time, and in making hives for the young colonies.

In choosing a situation for the apiary, place your hives where they shall be least exposed to the wind, and enjoy as much of the influence of the sun as possible; for wind always retards the bees in their work, while the sun's beams invite them to it. Although it is well known that bees will thrive well in high and windy situations, yet a low one is always to be preferred. In the neighbourhood of the apiary, there should be abundance of flowers, from which the bees may collect their wax and honey. "Were a choice allowed me," says Mr. Bonner, "where to place my bees, it would be in an early situation; a hollow glen by the side of a rivulet, surrounded with abundance of turnips in blossom in the spring, mustard and clover in summer, and heath in the latter end of summer and harvest; with a variety of other garden and wild flowers in their seasons." However, he would not be understood as if he hinted that bees will not thrive unless they be placed in such an advantageous situation, as the contrary can be proved: for bees have thriven amazingly well in places where they were not within reach of many of the above mentioned flowers: but although they will do well in most situations, and fly far for food, yet they will thrive far better when situated among or near good pasture, and surrounded with abundance of nectariferous corols.

The flowers of furze, broom, and the plane tree, are also highly grateful to bees, as all of them afford abundance of matter to collect their honey and wax from. Furze in particular, which generally flowers early, and continues long in blossom. There is also a great variety of other flowers, which, in their different seasons, afford employment and materials for the bees; such as lilies, rosemarys, yellow gowans, and the blossoms of crocuses, snow-drops, oziers, fallows, vetches, alders, poppies, beans, gooseberry bushes, and fruit-trees of all kinds. In short, bees refuse no flower when they are at a loss for variety. There is one thing, however, very observable, that whatever flower a bee first pitches upon, she always continues to work upon the same species till she is loaded, although she should be obliged to fly over better kinds, and even to some considerable distance for them; but if she cannot obtain a full loading from the flowers she prefers, she sometimes makes up the remainder from other flowers which she meets with.

Those who intend to erect an apiary, must take particular care to have it filled with proper inhabitants, as all their future profit and pleasure, their loss and vexation, will, in general, depend upon it. They must therefore pay the utmost attention to the choice of their stock-hives; for the man who takes care to keep good stock-hives, will soon gain considerably by them; but he who keeps bad ones, will, besides a great deal of trouble, and little or no success, soon become a broken bee-master. In September every stock-hive ought to contain as much honey as will supply the bees with food till June following; and as many bees as will preserve heat in the hive, and thereby resist the severity of a cold winter, and act as so many valiant soldiers, to defend the community from the invasions of foreign enemies in spring. Hence the bee-master should purchase a proper number of hives in August or September, when they are at the cheapest rate. They should be full of combs, and well stored with bees and honey, and should weigh at least 30lb. each; if heavier, so much the better, for light hives run a great risk of perishing by famine, unless the bees are supplied with food, which will cost as much expence, and a great deal more trouble, besides a considerable risk of their dying at last, after this extraordinary trouble and expence; while a well chosen hive of 30lb. weight, allowing 12lb. for the empty hive, bees, combs, &c. and 18lb. for the honey, will supply the republic with food till next June; a time when, it may be presumed, they will find abundance of provisions for themselves among the flowers. When a choice can be obtained, the youngest hives should always be preferred, because old hives are liable to vermin and other accidents. However, although a hive should be four or five years old, it ought not to be rejected, if it possess these two essential qualities, plenty of bees, and of honey; but if either of these be wanting, the purchaser will have much cause of regret, when too late to repair the injury he may sustain.

Thus valuable are the stores produced by this industrious and extraordinary insect, and thus curious its instinctive powers; powers, diminutive as its form is, scarcely rivalled by any other animals, and a mystery to the wisest of mankind:

His quidam signis, atque hæc exempla secuti,
Esse apibus partem divinæ mentis, et haustus
Ætherios, dixere: deum namque ire per omnes
Terrasque, tractusque maris, cœlumque profundum:

Hinc pecudes, armenta, viros, genus omne ferarum,
Quemque sibi tenues noscentem arcessere vitas;
Scilicet huc reddi deinde ac resoluta referri
Omnia.
Hence to the Bee some sages have assign'd
A portion of the God, and heavenly mind:
For God goes forth, and spreads throughout the whole,
Heaven, earth and sea, the universal soul;
Each at its birth from him all beings share,
Both man and brute, the breath of vital air;
These all return, and, loos'd from earthly chain,
Fly where they sprung, and rest in God again.
SOTHEBY.

HU'SCANS, in old writers, a sort of boots or buskins, made of cloth, and worn over the stockings.

HUSH. *interj.* (without etymology.) Silence! be still! no noise! (*Shakspeare*).

HUSH. *a.* (from the interjection.) Still; silent; quiet (*Shakspeare*).

To HUSH. *v. n.* (from the interjection.) To be still; to be silent (*Spenser*).

To HUSH. *v. a.* To still; to silence; to quiet; to appease (*Otway*).

To HUSH *up. v. a.* To suppress in silence; to forbid to be mentioned (*Pope*).

HU'SHMONEY. *s.* (*hush* and *money*.) A bribe to hinder information (*Swift*).

HUSK. *s.* (*huldsch*, Dutch.) The outmost integument of fruits. See GLUME.

To HUSK. *v. a.* (from the noun.) To strip off the outward integument.

HU'SKED. *a.* (from *husk*.) Bearing a husk; covered with a husk.

HU'SKY. *a.* (from *husk*.) Abounding in husks; consisting of husks (*Philips*).

HU'SO, in ichthyology. See ACCIPENSER.

HU'SSARS, are the national cavalry of Hungary and Croatia. Their regimentals consist in a rough furred cap, adorned with a cock's feather (the officers either an eagle's or a heron's); a doublet, with a pair of breeches to which the stockings are fastened, and yellow or red boots: besides, they occasionally wear a short upper waistcoat edged with furs, and five rows of round metal buttons; and in bad weather, a cloak. Their arms are a sabre, carbine, and pistols. They are irregular troops: hence, before beginning an attack, they lay themselves so flat on the necks of their horses, that it is hardly possible to discern their force; but being come within pistol-shot of the enemy, they raise themselves with such surprising quickness, and begin the fight with such vivacity on every side, that, unless the enemy is accustomed to their method of engaging, it is very difficult for troops to preserve their order.

HU'SSINGABAD, a town of Hindustan, in the province of Malwa, and on the frontiers of Nagpour. Lat. 22. 42. N. Lon. 77. 54. E.

HU'SSITES, in ecclesiastical history, a party of reformers, the followers of John Huss. This person, from whom the Hussites take their name, was born in a little village in Bohemia, called Huss, and lived at Prague in the highest reputation, both on account of the sanctity of his manners and the purity of his doctrine. He was distinguished by his uncommon erudition and eloquence, and performed at the same time the functions of professor of divinity in the university, and of ordinary pastor in the church of that city. He adopted the sentiments of Wickliffe, and the Waldenses; and in the year 1407 began openly to oppose and preach against divers errors in doctrine, as well as corruptions in point of discipline, then reigning in the church. Huss likewise endeavoured to the utmost of his power to withdraw the university of Prague from the jurisdiction of Gregory XII. whom the kingdom of Bohemia had hitherto acknowledged as the true and lawful head of the church. This occasioned a violent quarrel between the incensed archbishop of Prague and the zealous reformer; which the latter inflamed and augmented from day to day, by his pathetic exclamations against the court of Rome, and the corruptions that prevailed among the sacerdotal order. An accusation was brought against him in the year 1410, before the tribunal of John XXIII. by whom he was solemnly expelled from the communion of the church. Notwithstanding this sentence of excommunication, he proceeded to expose the Romish church with a fortitude and zeal that were almost universally applauded.

This eminent man, whose piety was equally sincere and fervent, though his zeal was perhaps too violent, and his prudence not always circumspect, was summoned to appear before the council of Constance. Secured, as he apprehended, from the rage of his enemies, by the safe conduct granted him by the emperor Sigismund, for his journey to Constance, his residence in that place, and his return to his own country, John Huss obeyed the order of the council, and appeared before it to demonstrate his innocence, and to prove that the charge of his having deserted the church of Rome was entirely groundless. However, his enemies so far prevailed, that, by the most scandalous breach of public faith, he was cast into prison, declared a heretic, because he refused to plead guilty against the dictates of his conscience, in obedience to the council, and burnt alive in 1415; a punishment which he endured with unparalleled magnanimity and resignation. The same unhappy fate was borne by Jerome of Prague, his intimate companion, who attended the council in order to support his persecuted friend. Jerome, indeed, was terrified into temporary submission; but he afterwards resumed his fortitude, and maintained the opinions which he had for a while deserted through fear, in the flames in which he expired in 1416.

The disciples of Huss adhered to their master's doctrine, after his death, with a zeal which broke out into an open war, that was carried on with the most savage and un-

paralleled barbarity. John Ziska, a Bohemian knight, in 1420, put himself at the head of the Hussites, who were now become a very considerable party, and threw off the despotic yoke of Sigismund, who had treated their brethren in the most barbarous manner. Ziska was succeeded by Procopius in the year 1424. The acts of barbarity that were committed on both sides were shocking and horrible beyond expression: for, notwithstanding the irreconcileable opposition between the religious sentiments of the contending parties, they both agreed in this one horrible principle, that it was innocent and lawful to persecute and extirpate with fire and sword the enemies of the true religion; and such they reciprocally appeared to each other. These commotions in a great measure subsided, by the interference of the council of Basil, in the year 1433.

HU'SSY. *s.* (corrupted from *housewife.*) A sorry or bad woman (*Southern*).

HU'STINGS, from the Saxon word *hustinge*, i. e. *concilium*, or *curia*, a court held in Guildhall before the lord mayor and aldermen of London, and reckoned the supreme court of the city. Here deeds may be inrolled, outlawries sued out, and replevins and writs of error determined. In this court also is the election of aldermen, of the four members of parliament for the city, &c. This court is very ancient, as appears by the laws of Edward the Confessor. Some other cities have likewise had a court bearing the same name, as Winchester, York, &c.

Hu'stings, signifies also the temporary erection in which the court of hustings is held, or to which the voters at an election are brought to poll.

HU'SUM, a town of Denmark, in the duchy of Sleswick, with a strong citadel. Lat. 54. 45. N. Lon. 9. 0. E.

To HU'STLE. *v. a.* (perhaps corrupted from *hurtle.*) To shake together in confusion.

HU'SWIFE. *s.* (corrupted from *housewife.*) 1. A bad manager; a sorry woman (*Shakspeare*). 2. An economist; a thrifty woman (*Shakspeare*).

To Hu'swife. *v. a.* (from the noun.) To manage with economy and frugality. (*Dryd.*)

HU'SWIFERY. *s.* (from *huswife*). 1. Management good or bad (*Tusser*). 2. Management of rural business committed to women (*Tusser*).

HUT. *s.* (hutte, Saxon; *hute*, French.) A poor cottage (*Swift. Thomson*).

HUTCH. *s.* (hwæcca, Sax. *huche*, French.) A corn chest (*Mortimer*).

HU'TCHINSON (John), a philosophical writer, whose notions have made no inconsiderable noise in the world, was born in 1674. He served the duke of Somerset in the capacity of steward; and in the course of his travels from place to place, employed himself in collecting fossils: we are told, that the large and noble collection bequeathed by Dr. Woodward to the university of Cambridge was actually made by him, and even unfairly obtained from him. When he left the duke's service to indulge his studies with more freedom, the duke, then master of the horse to George I. made him his riding surveyor, a kind of sinecure place of 200l. a-year, with a good house in the Meuse. In 1724, he published the first part of Moses's Principia, in which he ridiculed Dr. Woodward's Natural History of the Earth, and exploded the doctrine of gravitation established in Newton's Principia: in 1727, he published the second part of Moses's Principia, containing the principles of the Scripture Philosophy. From this time to his death, he published a volume every year or two, which, with the MSS. he left behind, were published in 1748, in 12 vols. 8vo. On the Monday before his death, Dr. Mead urged him to be bled; saying pleasantly, "I will soon send you to Moses," meaning to his studies; but Mr. Hutchinson taking it in the literal sense, answered in a muttering tone, "I believe, Doctor, you will;" and was so displeased, that he dismissed him for another physician, but died in a few days after, August 28, 1737. Singular as his notions are, they are not without some defenders, who have obtained the appellation of Hutchinsonians.

HU'TCHINSONIANS, the followers of John Hutchinson, who was of opinion that the Hebrew scriptures comprise a perfect system of natural philosophy, theology, and religion. His Moses's Principia contains, as he apprehends, the principles of the scripture philosophy, which are a plenum and the air. So high an opinion did he entertain of the Hebrew language, that he thought the Almighty must have employed it to communicate every species of knowledge, and that accordingly every species of knowledge is to be found in the Old Testament. Of his mode of philosophising, the following specimen is brought forward to the reader's attention. "The air, he supposes, exists in three conditions, fire, light, and spirit, the two latter are the finer and grosser parts of the air in motion: from the earth to the sun, the air is finer and finer till it becomes pure light near the confines of the sun, and fire in the orb of the sun, or solar focus. From the earth towards the circumference of this system, in which he includes the fixed stars, the air becomes grosser and grosser till it becomes stagnant, in which condition it is at the utmost verge of this system; from whence the expressions of *outer darkness* and *blackness of darkness* used in the New Testament seems to be taken. The reader may find a distinct and comprehensive account of the Hutchinsonian system in a book entitled, Thoughts concerning Religion, &c. printed at Edinburgh 1743; and in a letter to a bishop, annexed to it, first printed in 1732.

HUTTON (Dr. James), an able natural philosopher, was born at Edinburgh in June

1726. He received his grammar education at the high school of Edinburgh, and entered the University at the age of 14: his love of chymical studies was derived from the lectures of Professor Stevenson. His friends wished him to devote himself to the profession of the law; and he was in consequence apprenticed in 1743 to Mr. George Chalmers, writer to the signet. Mr. Chalmers, however, soon perceiving, that instead of transcribing law papers, he was amusing his fellow apprentices with chymical experiments, freed him from his obligations to serve him, and desired him to turn his attention to some other employment more congenial to his views. He fixed his choice on the study of medicine, as nearly related to his favourite pursuits; and after passing three years at Edinburgh, he studied two more at Paris; and returning by the Low Countries, took his degree of M. D. at Leyden, in 1749. The subject of his thesis was *De Sanguine et Circulatione in Microcosmo.*

Finding some difficulty in establishing himself in practice as a physician, he resolved to abandon the medical profession. He, therefore, turned his attention to farming; and for that purpose settled upon a small paternal estate in Berwickshire. Determined to make himself master of rural economy, he visited the county of Norfolk, and resided in the house of an able and sensible farmer. During his residence here, he made frequent excursions into other parts of England, in which the acquirement of agricultural information was his principal object, but in which he soon caught his love for geological inquiries. He continued his farming occupations till 1768, when he devoted his whole attention to scientific pursuits, let his farm, and went to reside at Edinburgh. Soon after this, he discovered that mineral alkali is contained in zeolite; a fact which has since been confirmed by Klaproth and others.

Dr. Hutton's first publication appeared in 1777: it was a small pamphlet under the title of *Considerations on the Nature, Quality, and Distinctions of Coal and Culm;* being designed to answer the question whether the small coal of Scotland be of the same nature as the culm of England.

For nearly 30 years, Dr. Hutton directed his thoughts principally to the subject of geology. The outlines of *his* theory were first published in the first volume of the Transactions of the Edinburgh Society. It has found an able advocate in Professor Playfair of Edinburgh, whose View of the Huttonian System of Geology is well known. (See also our article Geology.) This theory, however, has not met with so universal a reception as its inventor and some of its early advocates had expected. An ingenious theory of Rain was also advanced by Dr. Hutton in the same volume of the Edinburgh Transactions. Soon after this publication, he gave to the world, in 3 vols. 4to. *An Investigation of the Principles of Knowledge, and of the Progress of Reason from Sense to Science and Philosophy.* His Elements of Agriculture, the result of much study and long experience, was the last work he seemed anxious to publish; but it was left in manuscript at his death, which took place in March 1797. The character of an acute philosopher is certainly due to Dr. James Hutton. His studies, however, were desultory and irregular; and on this account his name is probably not destined to reach posterity with the same lustre as might have been expected, had his talents and genius been aided by regularity and method in his investigations.

HUXING of Pike. A particular method employed for catching this sort of fish. For this use, take as large bladders as can be gotten; blow them up, and tie them close and strong; at the mouth of each bladder tie a line, longer or shorter, according to the depth of water; at the end of each line fasten an armed hook artificially baited, and put them into the water, with the advantage of the wind, that they may gently move up and down the pond. When one master pike has struck, it is curious to see him bounce about in the water with a bladder. When almost spent, take him up. See Pike.

HUY, a town of the Netherlands, in the bishopric of Liege. It is seated on the Maese. Lat. 50. 32. N. Lon. 5. 22. E.

HUYGENS (Christian), an eminent mathematician, was born at the Hague, in Holland, in 1629, of a noble family. He discovered when young a great turn for science, and as early as 1651 gave a specimen of his abilities in a book entituled Theoremata de Quadratura Hyperboles, Ellipses, et Circuli, ex dato Portionum Gravitatis Centro. Not long after, he published a treatise on Horology, in which he discovered the model of a new-invented pendulum for clocks. In 1659 appeared his System of Saturn, giving an account of the discovery which he had made of a third satellite attending that planet. In 1661 he came to England, and was chosen a Fellow of the Royal Society. He afterwards resided at Paris, whither he had been invited by Colbert, who conferred a pension on him. He was also admitted a member of the academy of sciences. He left France in 1681, and retired to his native place, where he died in 1695. His Cosmotheoros, a Latin treatise on the plurality of worlds, was printed the same year, and in 1703 appeared his Opuscula Posthuma, in 1 vol. 4to. The year following came out his Opera Varia in 4 vols. 4to. superintended by Gravesande, and in 1728, his Opera Reliqua, 2 vols. 4to.

Mr. Huygens loved a quiet and studious manner of life, and frequently retired into the country to avoid interruption, but did not contract that moroseness which is so commonly the effect of solitude and retirement. He was one of the purest and most ingenious mathematicians of his age, and indeed of any other; and made many valuable discoveries. He was the first who discovered Saturn's ring, and a third satellite of

that planet, as mentioned above. He invented the means of rendering clocks exact, by applying the pendulum; and of rendering all its vibrations equal, by the cycloid. He brought telescopes to great perfection, and made many other useful discoveries.

HUYSUM (Justus Van), called the Old, an eminent painter, was born at Amsterdam in 1659. He studied under Nicholas Berchem, and became an excellent painter of flowers. He also painted landscapes and battles. He died in 1716.

Huysum (John Van), son of the preceding, but a far better artist. He was born at Amsterdam in 1682, and learned painting of his father. His reputation rose to such a height, that he fixed immoderate prices on his works, so that none but those who had princely fortunes could purchase them. No person was admitted into his room while he was painting; and his method of mixing the tints, and preserving the lustre of his colours, was an impenetrable secret. His flower pieces are exquisitely beautiful, and his landscapes and representations of animals are also very fine. He died in 1749. He had two brothers who were good painters, Justus and Jacob: the first died at the age of 22; and the latter in 1740, aged 60.

To HUZZ. *v. n.* To buzz; to murmur.

HUZZA'. *interj.* A shout; a cry of acclamation (*L'Estrange*).

To Huzza'. *v. n.* (from the interjection.) To utter acclamation (*King*).

To Huzza'. *v. a.* To receive or attend with acclamation (*Addison*).

HYACINTH, in botany. See Hyacinthus.

Hyacinth, African Blue. See Crinum.

Hyacinth, Lily.
Hyacinth, Peruvian. } See Scilla.
Hyacinth, Starry.

Hyacinth, in oryctology. See Zircon.

HYACI'NTHIA, an annual solemnity at Amyclæ, in Laconia, in honour of Hyacinthus and Apollo. It continued for three days, during which time the grief of the people was so great for the death of Hyacinthus, that they did not adorn their hair with garlands during their festivals, nor eat bread, but fed only upon sweetmeats (*Athen.*).

HYACI'NTHINE. *a.* (ὑακινθινος.) Made of hyacinths; resembling hyacinths.

HYACINTHUS, a son of Amyclas and Diomede, greatly beloved by Apollo and Zephyrus. He returned the former's love, and Zephyrus, incensed at his coldness, resolved to punish his rival. As Apollo once played at quoit with Hyacinthus, Zephyrus blew the quoit, which, as soon as it was thrown by Apollo, fell upon the head of Hyacinthus, and he was killed by the blow. Apollo was so disconsolate at his death, that he changed his blood into a flower, which bore his name; and placed his body among the constellations.

Hyaci'nthus. Hyacinth. In botany, a genus of the class hexandria, order monogynia. Corol six-cleft, with reflected segments; calyxless; stamens inserted on the receptacle; germ superior, with three nectariferous pores at the top. Twelve species; chiefly natives of the Cape, and the South of Europe. The species principally cultivated in the gardens of our own country, is H. orientalis, a plant indigenous to both Asia and Africa, and affording an infinity of varieties. The Dutch florists are particularly fond of the hyacinth, and propagate it in most of its species, and produce a great number of varieties. Our own specimens are, hence, chiefly obtained from Holland, and sometimes, in consequence of their rarity or other curiosity, at the enormous expence of twenty or thirty pounds sterling for a single bulb; and which is, nevertheless, usually repaid with abundant profit by its increase. See Nat. Hist. Pl. CXXV.

Hyaci'nthus *nonscriptus.* The bulbs of this species contain so much mucilage that, according to Mr. T. Willis, when dried they may be employed as a substitute for gum Arabic.

HYADES, five daughters of Atlas, king of Mauritania, were so disconsolate at the death of their brother Hyas, killed by a wild boar, that they pined away and died. They became stars after death, and were placed in Taurus, one of them being marked α by Bayer. They received the name of Hyades, from their brother Hyas. Their names are Phaola, Ambrosia, Eudora, Coronis, and Polyxus. To these some have added Thione and Prodice. The ancients supposed that the rising and setting of the Hyades was always attended with much rain.

HYÆNA, in mastiology. See Canis.

HYALINE. Hyalinus. (Υαλος, from ὑω pluo, the colour of rain water.) The colour of glass, with its transparency.

HY'ALITE, in oryctology. See Olivinus.

HY'ALOID Membrane, in anatomy, (membrana hyaloidea; from ὑαλος, glass, and ειδος, likeness.) Membrana arachnoidea. Capsule of the vitreous humour. The transparent membrane enclosing the vitreous humour of the eye.

HYBERNACLE. In botany, Herbæ compendium super radicem antequam excrescit. Philos. Bot.—Compendium herbæ totius, squamosum. Regn. Veg.—A compendium of the whole herb, before it grows up; or, in which the embryo of the future plant is inclosed by a scaly covering, and secured from external injuries during the winter. It is either a bulb, formed from the remains of past leaves; or a bud, from the rudiments of future leaves.

HYBLA, in ancient geography, or Megara, which last name it took from the Megareans, who led thither a colony; called also Hybla Parva, and Galeotis. In Strabo's time Megara was extinct; but the name Hybla remained, on account of its excellent honey named from it. It was situated on the east coast of Sicily, between Syracuse

and the Leontines. Galeotæ, and Megarenses, were the names of the people, who were of a prophetic spirit, being the descendants of Galeus the son of Apollo. Hyblæus was the epithet. This place has been frequently overwhelmed by the lava from mount Ætna.

Hybla Major, was situated in the tract lying between mount Ætna and the river Symethus.

Hybla Minor was an inland town of Sicily, now Ragusa.

HYBLÆA. In zoology, a tribe of the entomologic genus phalæna, as arranged by Fabricius. See Phalæna.

HYBRID Plant. In botany, a hybridous or mule plant. A monstrous vegetable produced from the mixture of two different species; yet extremely common, and as productive as the simple vegetable.

HY'BRIDOUS. *a.* (υβρις; *hybrida*, Latin.) Begotten between animals of different species (*Ray*).

HY'BRISTICA, (of υβρις, injury,) in antiquity, a solemn feast held among the Greeks, with sacrifices, and other ceremonies; at which the men attended in the apparel of women, and the women in that of men, to do honour to Venus in quality either of a god, or a goddess, or both.

HYDA'RTHRUS, (hydarthrus, i, m. υδαρθρος, from υδωρ, water, and αρθρον, a joint.) Hydarthron. Hydarthros. A white swelling, or watery joint. A genus of diseases arranged by Cullen in the class locales and order tumores. It is known by a uniform swelling around the joint, of the colour of the skin, and extremely painful. It mostly affects the knee and elbow joints. There are two species of this disease. 1. Hydarthrus rheumaticus, originating from rheumatism, which is mostly curable. 2. Hydarthrus scrofulosus, which is mostly incurable.

HYD'ATID, (*Hydatis, idis*, υδατις, a bladder, from υδωρ, water). A very singular animal, formed like a bladder, and distended with an aqueous fluid.

Hydatids, in the Linnean system of zoology, constitute a tribe of the genus tænia, belong to the class and order of intestinal worms. They are peculiarly characterised by being furnished with a vesicle or bladder, which is sometimes attached to them posteriourly, and in which they are sometimes altogether inclosed. They have been traced in mammals, serpents, and fishes, but chiefly in the first of these classes; and more commonly in the liver of man, and the liver and brain of sheep, than in any other animal tribe or organs.

Cullen arranges the diseases thereby produced in man, in the class *locales* and order *tumores*. If the vires naturæ medicatrices be not sufficient to effect a cure, the patient mostly falls a sacrifice to their ravages.—Dr. Baillie gives the following interesting account of the hydatids, as they are sometimes found in the liver: "There is no gland in the human body in which hydatids are so frequently found as the liver; except the kidneys, where they are still more common. Hydatids of the liver are usually found in the cyst, which is frequently of considerable size, and is formed of very firm materials, so as to give to the touch almost the feeling of cartilage. This cyst, when cut into, is obviously laminated, and is much thicker in one liver than another. In some livers it is not thicker than a shilling, and in others it is near a quarter of an inch in thickness. The laminæ which compose it are formed of a white matter, and on the inside there is a lining of a pulpy substance, like the coagulable lymph. The cavity of the cyst, I have seen, in one instance, subdivided by a partition of this pulpy substance. In a cyst may be found one hydatid, or a greater number of them. They lie loose in the cavity, swimming in a fluid; or some of them are attached to the side of the cyst. They consist of a round bag, which is composed of a white, semi-opaque, pulpy matter, and contain a fluid capable of coagulation. Although the common colour of hydatids be white, yet I have occasionally seen some of a light amber colour. The bag of the hydatid consists of two laminæ, and possesses a good deal of contractile power. In one hydatid this coat or bag is much thicker and more opaque than in another, and even in the same hydatid different parts of it will often differ in thickness. On the inside of an hydatid, smaller ones are sometimes found, which are commonly not larger than the heads of pins, but sometimes they are even larger in their size than a gooseberry. These are attached to the larger hydatid, either at scattered irregular distances, or so as to form small clusters; and they are also found floating loose in the liquor of the larger hydatids. Hydatids of the liver are often found unconnected with each other; but sometimes they have been said to inclose each other in a series, like pill-boxes. The most common situation of hydatids of the liver is in its substance, and inclosed in a cyst; but they are occasionally attached to the outer surface of the liver, hanging from it, and occupying more or less of the general cavity of the abdomen. The origin and real nature of these hydatids are not fully ascertained; it is extremely probable, however, that they are a sort of imperfect animalcules. There is no doubt at all, that the hydatids in the livers of sheep are animalcules; they have been often seen to move when taken out of the liver and put into warm water; and they retain this power of motion for a good many hours after a sheep has been killed. The analogy is great between hydatids in the liver of a sheep, and those of the human subject. In both they are contained in strong cysts, and in both they consist of the same white pulpy matter. There is undoubtedly some difference between them in simplicity of organization; the hydatid in the human liver being a simple uniform

bag, and the hydatid in that of the sheep having a neck and mouth appended to the bag. This difference need be no considerable objection to the opinion above stated. Life may be conceived to be attached to the most simple form of organization. In proof of this, hydatids have been found in the brains of sheep, resembling almost exactly those in the human liver, and which have been seen to move, and therefore are certainly known to be animalcules. The hydatids of the human liver indeed, have not, as far as I know, been found to move when taken out of the body and put into warm water; were this to have happened, no uncertainty would remain. It is not difficult to see a good reason why there will hardly occur any proper opportunity of making this experiment. Hydatids are not very often found in the liver, because it is not a very frequent disease there; and the body is allowed to remain for so long a time after death before it is examined, that the hydatids must have lost their living principle, even if they were animalcules: however, it is very strong; and it appears more difficult to account for their production, according to the common theory of generation, than for that of intestinal worms. We do not get rid of the difficulty by asserting, that hydatids in the human liver are not living animals; because in sheep they are certainly such, where the difficulty of accounting for their production is precisely the same." For the rest see TÆNIA.

HYDATOSCOPIA, called also HYDROMANCY, a kind of divination or method of foretelling future events by water.

HYDE (Edward), earl of Clarendon, and lord chancellor of England, was born at Dinton in Wiltshire, of an ancient family, in 1608. In 1622 he was admitted of Magdalen hall, Oxford, from whence he removed to the Middle Temple, where he studied the law with great success. In 1640 he was chosen into parliament to represent Wotton-Basset in Wiltshire, where he distinguished himself by his moderation and firm regard to the constitution. He sat in the long parliament for Saltash in Cornwall; and when the commons prepared a charge against the judges Davenport, Weston, and Trevor, Mr. Hyde was pitched upon to carry it up to the lords, to whom he made an admirable speech. He was also employed to draw up the articles of impeachment against the earl of Strafford; but when he saw to what unwarrantable lengths matters were going, he left the party, and opposed the bill of attainder with warmth. He was afterwards appointed chairman on several committees; but when the commons passed an ordinance for raising the militia against the king, he considered it as an act of rebellion, and in consequence of it left them, and went to the king at York. In 1642 he received the honour of knighthood, and the chancellorship of the exchequer. In 1644 he was one of his majesty's commissioners at the treaty of Uxbridge. When the royal cause was ruined he went over to Jersey, and in that retirement began his History of the Rebellion, towards which he received considerable assistance from the king himself. In 1648 he was at Paris, and the year following was sent by Charles II. with lord Cottington to the court of Madrid, where he remained two years. In 1657 he was made chancellor of England, which post was continued to him at the restoration, when he was also chosen chancellor of the university of Oxford. He was besides created a peer of the realm, and in 1661 obtained the title of earl of Clarendon. He conducted himself in his high station with great wisdom and moderation; yet he was not without his enemies, who tried various ways to effect his ruin. The marriage of James duke of York to the chancellor's daughter, was made one step for alienating the king from him; but as he had not been privy to that match, and was besides a great enemy to it, his majesty assured him that "this accident should not lessen the esteem and favour he had for him." In 1663 the earl of Bristol exhibited various charges against him in the house of lords from private pique, but this prosecution ended greatly to the honour of the chancellor. But the building of Clarendon-house, which was done at a vast expence and in the most ostentatious manner, brought upon him much popular odium, and with other circumstances estranged Charles's affection from him. In 1667 the seals were taken from him, and he was moreover impeached of high-treason and other crimes and misdemeanors, in consequence of which he retired privately to France, and as soon as he was gone an act of banishment was passed against him. In 1668, while he was at Evreux, confined to his bed, a party of English seamen broke into his chamber, and dragged him into the middle of the yard, where they were about to dispatch him, when their lieutenant arrived and disarmed them. He died at Rouen in 1673, and his remains being brought to England, were interred in Westminster abbey. His lordship was twice married. By his first lady he had no issue, but by the second he had four sons and two daughters. Anne, the eldest, was married to the duke of York, by whom she had two daughters, Mary and Anne, who were successively queens of England. Lord Clarendon's History of the Rebellion, which is, perhaps, the noblest history in our language, was printed at Oxford in 1704, in folio and 8vo. He also wrote, 1. Animadversions upon Mr. Cressy's book entitled, Fanaticism fanatically imputed to the Catholic Church by Dr. Stillingfleet, &c. 8vo, 1672; 2. A Survey of Mr. Hobbes's Leviathan, 4to; 3. Miscellaneous Tracts, collected and printed in 1 vol. folio; 4. An Account of his own Life, printed in 1759. (*Watkins*).

HYDNUM. In Botany, a genus of the class cryptogamia, order fungi. Fungus

echinated or prickly underneath. Nineteen species, of which twelve grow on a stem, and the rest are stemless, or nearly so. Of these species thirteen are indigenous to the woods and wilds of our own country. H. imbricatum, which is one of these, is eaten in Italy, where also it grows indigenously, and is highly esteemed as an esculent.

HYDRA, in fabulous history, a serpent in the marsh of Lerna, in Peloponnesus, represented by the poets with many heads, one of which being cut off, another immediately succeeded in its place, unless the wound was instantly cauterized. Hercules attacked this monster; and having caused Iolaus to hew down wood for flaming brands, as he cut off the heads he applied the brands to the wounds, by which means he destroyed the hydra. This hydra with many heads is said to have been only a multitude of serpents, which infested the marshes of Lerna, near Mycene, and which seemed to multiply as they were destroyed. Hercules, with the assistance of his companions, cleared the country of them, by burning the reeds in which they lodged.

HYDRA, in astronomy, an old southern constellation. It consists of 59 stars of the first six magnitudes, viz. 0. 1. 1. 12. 13. 32.

HYDRA. Polype. In zoology, a genus of the class vermes, order zoophyta. Animal fixing itself by the base, linear, gelatinous, naked, contractile, and furnished with setaceous tentacles, inhabiting fresh waters, and producing its deciduous offspring or eggs from the sides. Five species, three of which are common to the waters of our own country; but the chief of which is H. viridis, having about ten tentacles shorter than the body. It inhabits stagnant waters and slow streams in Europe, generally on the under surface of plants, and appears like a little transparent green jelly when contracted and quiescent: when expanded, it is a linear body, fixed at one end, and surrounded at the other by tentacles or arms placed in a circle round the mouth, and generally producing its young from the sides; these at first seem small papillæ, increasing in length till they assume the form of the parent, and then dropping off. The whole tribe has a most wonderful faculty of reproducing parts which have been destroyed; and if cut or divided in any direction, each separate part becomes a perfect polype; as slips of certain plants become the same plants in a perfect form. See Nat. Hist. pl. CXXX.

HYDRABAD, the capital of Golconda, in the Deccan of Hindustan, seated on a river that falls into the Kistna. Lat. 17. 12. N. Long. 78. 51. E.

HYDRABAD, a fort of Hindustan Proper, in the province of Sindy. It is situate on the Indus, not far above the head of the Delta. Lat. 25. 29. N. Lon. 69. 30. E.

HYDRACHNA. In zoology, a genus of the class insectæ, order aptera. Head, thorax, and abdomen, united; feelers two, jointed; eyes from two to six; legs eight, ciliate, and formed for swimming. These are inhabitants of the water, and swim with great velocity; they prey on the larvæ of tipulæ and monoculi; the eggs are red, at first spherical, but afterwards semilunar; larva six-footed, and furnished with a singular proboscis. Forty-nine species, common to most climates and countries. They may be thus subdivided:

A. Eyes two: body tailed.

B. Eyes two: body marked with a fork.

C. Eyes two: body glabrous.

D. Eyes four: of which there are only four species.

E. Eyes six: of which there is only one species.

We can only notice the following:

1. H. Globator. Body globular with red eyes; male greenish, spotted; female bluish, immaculate, and twice as large. Found more plentifully than any other species in the stagnant waters of our own country.

2. H. Geographica. Spherical, black, with four scarlet spots and dots: eyes, feelers, and last joint of the legs, red; found in ditches. The largest and the most beautiful of the genus.

There is another variety with black feelers.

3. H. Vernalis. Oval, greenish, with a deepish disk and rufous fork. Has the appearance of a grey dot with extended white legs. Found in inundated meadows.

HYDRAGOGUE, (*Hydragoga*, υδραγωγα, from υδωρ, water and αγω, to drive out). Medicines are so termed which possess the property of increasing the secretions or excretions of the body, so as to cause the removal of water from any of its cavities; such as tonics, diuretics, cathartics, &c.

HYDRANGEA. In botany, a genus of the class decandria, order digynia. Calyx superior, five-toothed; coral five-petalled; capsule two-celled, two-beaked, opening by an aperture between the horns. Four species: three American, one a Chinese plant. We shall notice two.

1. H. Arborescens. Cymes naked; leaves oblong-ovate, pointed, toothed, glabrous; flowers white, inodorous: stamens from eight to ten. A native shrub of Virginia.

2. H. Hortensis. Cymes radiate; leaves elliptic, tapering to both ends, toothed, glabrous. A branched shrub of China, now very generally to be met with in most greenhouses: the branches cross-armed, green with purple spots; leaves globular, watery, on a nearly erect capillary stem. Three species, all exotics.

HYDRARGYRUM (from υδωρ water, and αργυρον silver; q. d. liquid silver). Mercury. Quicksilver. In mineralogy, a genus of the class metals: opake, silver-coloured, resembling melted tin; always in a state of fluidity in the common temperature of the atmosphere; becoming solid and malleable at a temperature of 0,390; specific gravity 13,568: evaporating in a low heat. Next

after gold and platina, it is the most ponderous substance known; a cubic foot of very fine mercury weighs 947 pounds. It was first proved to be susceptible of congelation in the middle of the last century. Its excessive weight, habitual fluidity, extreme volubility, and the singular alterations it is liable to suffer by combination, may induce us to regard it as a peculiar substance, not otherwise allied to the metals than by its brilliancy, gravity, and combustibility. Mercury is not found abundantly in nature, but nevertheless in a sufficient abundance and a sufficient variety of forms to offer about twelve different species.

1. H. Virgineum. Native or virgin mercury. Argentum vivum. Pure, fluid, very ponderous, of a silvery colour and lustre; found in globules or in large masses, in earths and soft stones, but most frequently in the cavities and interstices of its own ores. At Idria, in Spain, and in America, it is collected in the cavities and in the clefts of the rocks, by making depressions, in which it rests. It is likewise found in clay at Almaden, and in beds of chalk in Sicily. It is also found at times in silver and lead ores, as well as mixed with white oxyd of arsenic.

2. H. Amalgamma. Native amalgam; amalgam of silver. Ponderous, of a silvery colour and lustre, rather solid, evaporating when heated, and leaving pure silver. Found in the mines of Hungary, and in Sweden, sometimes in larger masses imbedded in quark, hornstone, or spar, but generally running through other ores of quicksilver.

3. H. Sublimatum. Corneous mercury; muriat of mercury. Without metallic lustre, subliming almost entirely before the blowpipe in the form of a white smoke, without sulphureous flame or vapours. Found in the mines of Wolfstein and Moersfeld, in the Palatinate, and in the duchy of Deuxponts, in scales or grains, or crystallized in small four-sided prisms: colour smoke-grey, yellowish, grey, yellowish white, lemon yellow, or greenish; the crystals have a pearly lustre, and when thrown on red hot charcoal discover a garlic-like smell. It consists of mercury combined with sulphuric and muriatic acids in various proportions.

4. H. Larvatum. Red oxyd of mercury. Red native precipitate, deep red, of an earthy texture, heavy, subliming its mercury by heat. Found mixed with sand, near Alicant in Spain, and the soil of the mercury mines of Idria and Buschians.

5. H. Æthiops. Native Æthiops: Æthiops mineral. Black; without lustre or transparency, staining the fingers; easily melting; and if the heat be increased, entirely subliming with a sulphureous smell and flame. Found in the mines of Nassau and Idria: and consisting of mercury merely mixed with sulphur.

6. H. Cinnabaris. Native cinnabar. Sulphuret of mercury. Ponderous, without metallic lustre, red, scarlet when scraped, easily melting, dissipating before the blowpipe with a blue flame and sulphureous smell. The colour is sometimes scarlet; sometimes cochineal-red; and the substance is sometimes found in crystals. It exists in Peru, Chili, New Spain, China, Siberia, Hungary, Sicily, and Germany, in veins, grains, or ramifications, in a matrix of clay, quark, spar, schist, or pyrite.

7. H. Hepaticum. Hepatic mercury, or mercurial ore. Ponderous, of a common form, burning with a blue flame, but evaporating only in part. Its texture is sometimes slaty, sometimes compact. Found in the mines of Idria: it is nothing but cinnabar mixed with indurated clay.

8. H. Cupriferum. Cupreous mercury. Greyish-black mercury. Dark-grey, of a glassy texture, decrepitating and emitting sulphureous flames when heated, and before the blowpipe, leaving a bead of copper. Found in beds of pot-stone, quark, and schist, in the mines near Moschellandsburg and Sumatra.

9. H. Glandulosum. Mercurius ruber. Arsenical mercury. Without metallic lustre, red with a scarlet streak, emitting sulphureous flames and arsenical vapours when heated. Found in the mines of Japan, and contains mercury mineralized by sulphur and arsenic.

10. H. Mixtum. Silver-mixed mercury. In the form of white lumps, emitting sulphureous and arsenical vapours when heated. Found in the mines of Dauphiny.

11. H. Phlogisticum. Of a dull opake colour, ponderous, brittle, flaming and emitting disagreeable vapours when heated. Found in the mines of Idria.

12. H. Fœtens. Bituminous mercurial ore. Dark red-brown, lamellar, somewhat pellucid, smelling like liver of sulphur when rubbed. Found on hornstone in the mines of Idria.

Mercury is one of those fluid matters which are the most easily and uniformly heated. If exposed to fire in close vessels, it boils like other fluids. The vapour into which it is transported by ebullition, appears in the form of a white smoke, obscures the transparency of the vessels into which it is received, and is condensed by cold into drops of liquid or purified mercury. Mercury has no taste that the nerves of the tongue and palate can perceive; rubbed for a short time between the fingers, it emits a slight peculiar smell. It is extremely susceptible of oxydation by the contact of air and other bodies; a blackish-grey pellicle is continually forming on its surface, which is called black oxyd of mercury. If heated, with access of air, this metal is changed into red, brilliant, scaly, earthy oxyd or powder, called precipitate per se, or hydrargyrus calcinatus of the pharmacopeias. It is usually made with the bottle called Boyle's hell, in which a quantity of mercury is put, in such a

proportion as to be spread in a very thin layer over its surface. The mouth of the bottle is fitted with a crystal cylindrical stopper, perforated with a capillary tube. The bottle is then placed on a sand bath, and the mercury is thus heated to ebullition. The capillary aperture in the stopper of the tube admits the external air, without suffering the mercury to escape. Digestion in this manner for the space of some months, affords in the end a large proportion of red mercurial oxyd, or calcined mercury. Mercury is very little, if at all, liable to solution in water: although water remaining over mercury a considerable time, contracts an evident metallic taste; and if boiled upon it, is said to acquire a vermifugal property: but the mercury does not appear to be at all changed, or deprived of any of its weight. It is not more disposed than other metallic substances to unite with earths. Concentrated sulphuric acid is capable of dissolving mercury, with the aid of heat; sulphureous acid gas is disengaged, and a white oxyd is formed, upon which if a large quantity of hot water is poured, a beautiful yellow oxyd, the sulphas hydrargyri, is precipitated, known by the name of turbith mineral, or yellow precipitate, or hydrargyrus vitriolatus of the shops. The nitric acid dissolves mercury with so great facility, that no external heat nor concentrated acid is required. A mercurial oxyd is produced by this decomposition, the nitras hydrargyri, or hydrargyrus nitratus, a nitrous acid gas being at the same time disengaged. The nitrate of mercury is corrosive; fused in a crucible, or better in a retort, it yields oxygen or nitrogen gases, the remaining oxyd becoming yellow, and at length a lively red, which is the red precipitate. The solution of mercurial nitrat forms mercurial water, which is of use to ascertain the presence of sulphuric and muriatic salts in mineral waters, and is also used as a powerful escharotic by surgeons. The muriatic acid does not act in any sensible degree upon pure metallic mercury, except by long digestion; though it is one of those which have the strongest affinity with that metal, readily combining with all the mercurial oxyds, and forming different products, according as the oxyd is more perfect or imperfect. The combination of oxyd of mercury with muriatic acid, is susceptible of two different states: in one, formed with the common muriatic acid, it is mild mercurial muriat; in the other, formed with the oxygenated muriatic acid, it is corrosive sublimat, corrosive mercurial muriat, oxymuriat of mercury, or hydrargyrus muriatus. This neutral saline salt is capable of entering into combination with running mercury; when it loses its peculiar taste and solubility, with most other of its saline properties, and the product is known by the name of mercurius dulcis, or calomel of the shops. The acetous acid dissolves the oxyd of mercury, and affords white foliated crystals, the hydrargyrus acetatus. The boracic acid is not capable of dissolving mercury without an intermedium. In what manner the fluoric and carbonic acids act on mercury, is not at present well known. The neutral salts are understood to possess no strong powers of acting on this metal; it, however, incorporates readily with sulphat of potash. Mercury artificially mixed with sulphur, forms the black or red sulphurated oxyds, known, on account of their colour, by the names of æthiops, or cinnabar. See Sulphuretum hydrargyri nigrum, and Sulphuretum hydrargyri rubrum. Mercury amalgamates with most other metals. On this property are founded the art of gilding metals, the tinning of glasses, the working of gold and silver mines, &c. Mercury is also employed in painting, in forming mirrors, philosophical instruments, &c. The uses of this metal in the practice of physic and surgery are very considerable. The following are the chief preparations:

Hydra'rgyrus Acetatus. Mercurius acetatus. Pilulæ Keyseri. By this preparation of mercury, the celebrated Keyser acquired an immense fortune in curing the venereal disease. It is an acetit of quicksilver, and termed acetis hydrargyri in the new chymical nomenclature. The dose is from three to five grains; yet notwithstanding the encomium given to it by some, it does not appear to be so efficacious as other preparations of mercury.

H. Calcina'tus. Mercurius calcinatus. Calcined mercury. This preparation of mercury is given with great advantage in the cure of siphilis. Its action, however, is such, when given alone, on the bowels, as to require the addition of opium, which totally prevents it. It is also given, in conjunction with opium and camphor, as a diaphoretic, in chronic pains, and diseases of long continuance.

H. Cum Cre'ta. Mercurius alkalisatus. This preparation of mercury possesses alterative properties in cutaneous and venereal complaints, in obstructions of the viscera, or of the prostate gland, given in the dose of half a scruple to half a drachm, two or three times a day.

H. Cum sulphu're. Æthiops mineral. This is a black sulphuret of mercury, and therefore called sulphuretum hydrargyri nigrum in the new chymical nomenclature. The mercury and sulphur are triturated together: the blended mass thus obtained consists of sulphur and an imperfect oxyd of mercury. The mercury, by this admixture of the sulphur, is deprived of its salivating power, and may be administered with safety to all ages and constitutions as an anthelmintic and alterative.

H. Muria'tus. Mercurius corrosivus. Mercurius sublimatus corrosivus. An extremely acrid and violently poisonous preparation. It is an oxymuriate of quicksilver, and therefore called in the new chymical no-

menclature murias hydrargyri oxygenatus. Given internally in small doses properly diluted, and never in the form of pill, it possesses oxygenating, antisiphilitical, and alterative virtues. Externally applied in form of lotion, it facilitates the healing of venereal sores, and cures the itch.

H. Muria'tus Mitis. Mercurius præcipitatus dulcis. This mild muriate of quicksilver possesses similar virtues to calomel, for which it is often substituted. See Calomelas.

H. Nitra'tus Ruber. Mercurius corrosivus ruber. Mercurius præcipitatus ruber. Red precipitate. This red oxyd of mercury is prepared with the nitrous acid. It is of extensive use in the practice of surgery, as a stimulant and escarotic. Finely levigated, and mixed with the common cerates, it proves an excellent application to indolent ulcers, especially those which remain after burns and scalds, and where the granulations are indolent.

H. Præcipita'tus Cinereus. This preparation ordered in the Edinburgh Pharmacopeia, is used as an alterative in cases of pains arising from an admixture of rheumatism with siphilis. It may be substituted for the hydrargyrus sulphuratus ruber, in fumigating ozena, and venereal ulcerated sore throat, on account of its not yielding any vapour offensive to the patient.

H. Purifica'tus. Purified quicksilver is sometimes administered in its metallic state in doses of one ounce or more in constipation of the bowels.

H. Sulphura'tus Ruber. Cinnabar factitia. This is the sulphuretum hydrargyri rubrum of the new chymical nomenclature, it being a red sulphuret of mercury: it is esteemed as a mild mercurial alterative, and is given to children in cases of strophulus, porrigo, tænia, &c.

H. Vitriola'tus. Turpethum minerale. Mercurius emeticus flavus. Sulphas hydrargyri. Formerly this medicine was in more general use than in the present day. It is a very powerful and active alterative when given in small doses. Two grains act on the stomach so as to produce violent vomitings. It is recommended as an errhine in cases of amaurosis. In combination with antimony it acts powerfully on the skin.

HYDRA'STIS. Yellow-root. In botany, a genus of the class polyandria, order polygynia. Calyxless; petals three; nectaryless; berry composed of one-seeded granulations. One species; a native of Canada, with tuberous root, yellowish within; white terminal flowers; succeeded by red, succulent fruit.

HYDRAU'LIC. } *a.* (from *hydraulics*.)
HYDRAU'LICAL. } Relating to the conveyance of water through pipes, &c. (*Derh.*)

Hydrau'lic Engines, are mechanical contrivances invented for the purpose either of conveying water from one situation to another, particularly from a lower to a higher; or, by means of the force or pressure of water, to perform some mechanical operation, as grinding, boring, or sawing. The latter kind of engines is spoken of under the words Flour Mill, Oil Mill, Saw Mill, &c. The former comprise various kinds, such as the Persian Wheel, Pumps, Pressure Engines, &c. See our articles Engine, Persian Screw, &c. and for a variety of others, the article Hydraulic Machines, in Gregory's Mechanics, Vol. II. pp. 203, 230, &c.

HYDRAULICON, or Water Organ. An organ actuated by water, and the invention of which is of much higher antiquity than that of the pneumatic or wind organ. Little is known concerning the particular construction or powers of this curious instrument. It is, however, asserted by some authors, to have produced its sounds by the compression of water on a large vessel filled with air, by which pressure the air was forced from the vessel into the tibiæ, or pipes (*Busby*).

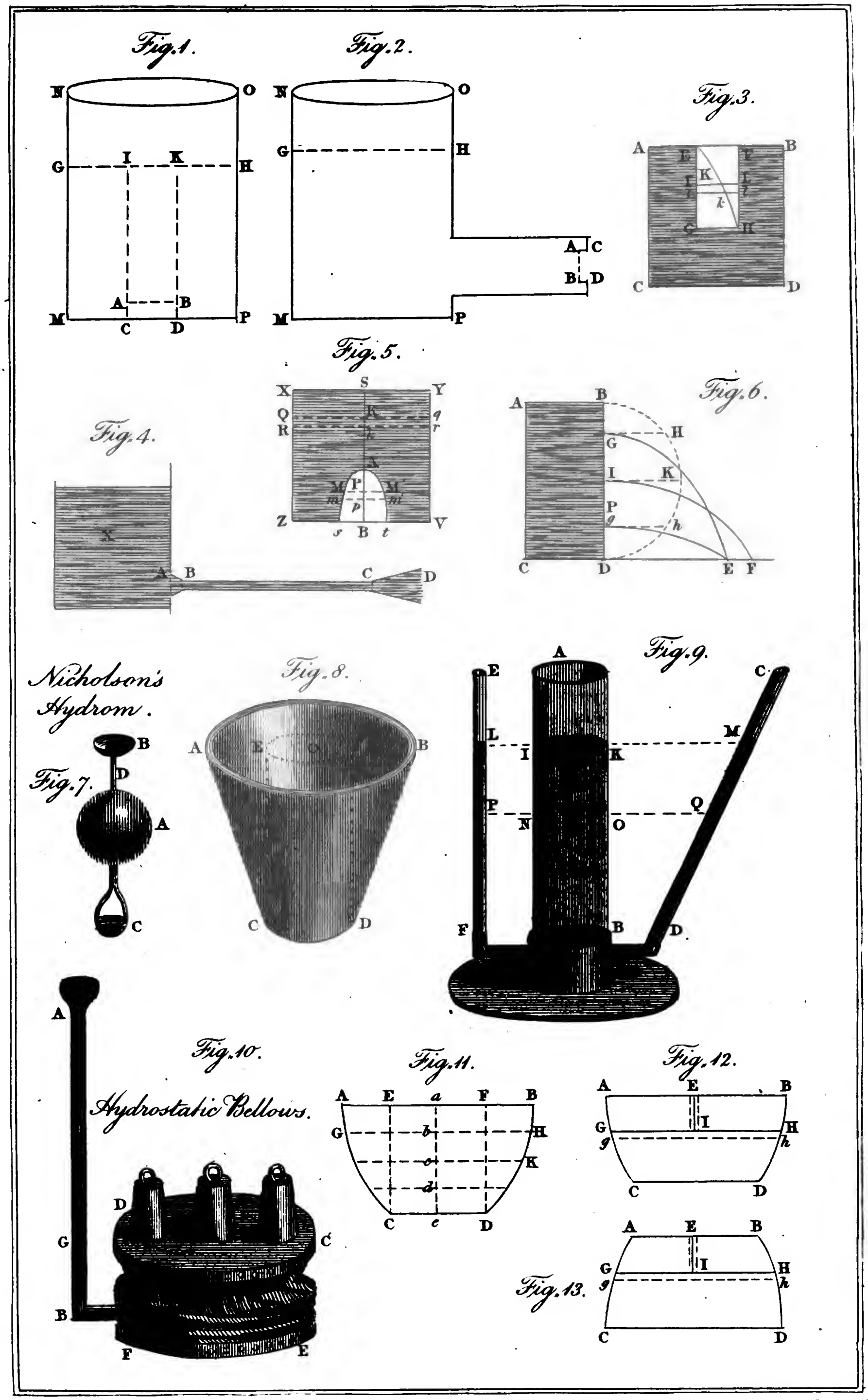
HYDRAULICS (from υδωρ *water*, and αυλος *a pipe*), signifies primarily the science or doctrine of the motion of water through pipes. It is now understood to comprehend the science of the motion of liquids universally, the laws of such motion, the effect of moving liquids upon bodies in them, either at motion or rest, &c. In the language of modern mathematicians, it is considered as synonymous with Hydrodynamics: which see.

HYDRIAPHORÆ, a designation given to wives of strangers residing at Athens.

HYDROCARBONATS, are invisible, elastic gases, of a strong, disagreeable smell, irrespirable, and incapable of supporting combustion, insoluble in water, burning with oxygen with a blue lambent flame, and producing carbonic acid gas and water. From their furnishing charcoal, when decomposed by melting sulphur, and from the products of their combustion, they evidently contain oxygen.

There are different species of Hydro-carbonats, depending on the proportion of their constituents, which, from their specific gravities, are commonly distinguished into heavy and light Hydro-carbonats. The light Hydro-carbonats are obtained by the distilling of wet charcoal, or by transmitting the vapour of alcohol through an ignited tube. Specific gravity .00059 to .00064. The heavy Hydro-carbonats are obtained by distillation from camphor, ether, animal and vegetable substances, and by collecting the gas of marshes: specific gravity .0008 to .00082. The latter contain more carbon, require more oxygen for their decomposition, and furnish a larger proportion of carbonic acid gas, and less water, than the former (*Edin. Dis.*) See Carburet of *Hydrogen*.

HYDROCA'RDIA (*Hydrocardia*, *æ*, f. υδροκαρδια; from υδωρ, water, and καρδια, the



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heart.) *Hydrocordis. Hydrops pericardii.* Dropsy of the heart. Dropsy of the pericardium. A collection of fluid in the pericardium, which may be either coagulable lymph, serum, or a puriform fluid. It produces symptoms similar to those of hydrothorax, with violent palpitation of the heart, and mostly an intermittent pulse. It is incurable.

HYDRO'CASIS. Frog-bit. In botany, a genus of the class diœcia, order dodecandria. Calyx three-cleft; petals three. Male: three inner filaments appendaged. Female; styles six; capsules inferior, six-celled, many-seeded. One species only, H. Morsus ranæ, common to the ditches of our own country.

HYDROCE'LE (*Hydrocele, es,* f. υδροκηλη; from υδωρ, water, and κηλη, a tumour). *Oscheocele. Oscheophyma. Hydrops scroti. Hydrops testis.* Dropsy of the scrotum. A genus of disease in the class *cachexiæ*, and order *intumescentiæ*, of Cullen; known by a soft, pyramidal, fluctuating, generally pellucid swelling of the scrotum, increasing slowly, and without pain. There are three species of this disease. 1. *Hydrocele integumentorum*, or a mere anasarcous swelling of the scrotum. 2. *Hydrocele tunicæ vaginalis.* This is properly the hydrocele: the swelling is mostly of a pyramidal form, and is known by an evident fluctuation. It should carefully be distinguished from hernia and orchitis. 3. *Hydrocele funiculi spermatici.* An anasarcous swelling of the spermatic cord, which is sometimes diffused throughout the cord, and sometimes confined to one or two enlarged cells, when it is said to be encysted.

HYDROCE'PHALUS (*Hydrocephalus, i.* m. υδροκεφαλος; from υδωρ, water, and κεφαλη, the head). *Hydrocephalum.* Dropsy of the brain. Dropsy of the head. A genus of disease arranged by Cullen in the class *cachexiæ*, and order *intumescentiæ*. It is distinguished by authors into external and internal: 1. *Hydrocephalus externus*, is a collection of water between the membranes of the brain. 2. *Hydrocephalus internus*, is when a fluid is collected in the ventricles of the brain, producing dilatation of the pupils, apoplexy, &c. See Apoplexia. It is sometimes of a chronic nature, when the water has been known to increase to an enormous quantity, effecting a diastasis of the bones of the head, and an absorption of the substance of the brain.

HYDROCO'TYLE. White-rot. Water-navelwort. In botany, a genus of the class pentandria; order digynia. Umbel simple; involucre four-leaved; petals entire; fruit orbicular, compressed. Nineteen species; chiefly natives of the Cape, West Indies, and America: two indigenous to our own marshes and ditches. H. vulgaris, with five-flowered umbels, supposed, but without reason, to produce the rot in sheep. H. inundata, with fire-flowered umbels in pairs.

HYDRODYNAMICS (from Υδωρ *water*, and Δυναμις, *power*), is properly that science which treats of the power of water, whether it acts by pressure or by impulse. In the usual acceptation, however, it is that part of mechanical science which relates to the motion of liquids, or non-elastic fluids, and the forces with which they act upon bodies. In this sense *Hydrodynamics* bears the same relation to *Hydrostatics*, as does *Dynamics* to *Statics*.

Hydrodynamics is the most difficult and least advanced branch of mechanics. Whatever we know of it is almost entirely due to the researches of the moderns; for the only work on the mechanism of fluids which has reached us from the ancients, is the piece of Archimedes in two books, De Insidentibus humido, in which the only inquiries respect the sinking and floating of bodies in fluids, their relative gravities, levities, situations, and positions, while in equilibrio. We find, it is true, some hints and rules upon the motion of fluids, in a treatise attributed to Sextus Julius Frontinus, inspector of public fountains at Rome, under the emperors Nerva, Cocceius, and Trajan, entitled De Aquæductibues Urbis Romæ Commentarius; but they are not of sufficient importance to deserve much attention from a student of this science. Benedict Castelli was the first who opened the way to a true measure of the flux of waters, in his treatise Della mesura dell' Acque Currenti; which measure he found to depend upon the area of the section, and the velocity of the water, conjointly. The most valuable and important discoveries and theorems in this department of science, are given in Sir Isaac Newton's Principia, book II.; the Hydrodynamique of Daniel Bernoulli; the Traité des Fluides by M. D. Alembert; the Examen Maritimo-Theorico-Practico of D. George Juan; the excellent Hydrodynamique of M. Bossut; Principes d'Hydraulique by M. Buat; and the Handbuch der Mechanik und der Hydraulik by Mr. Eytelwein. To these may be added an ingenious paper on the Motion and Resistance of Fluids by Mr. Vince, in the Philosophical Transactions for 1795; and those by the late Dr. Matthew Young, in the Irish Transactions.

Could we know with certainty the mass, the figure, and the number of particles, of a fluid in motion, the laws of its motion might be determined by the resolution of this problem, viz. to find the motion of a proposed system of small free bodies acting one upon the other in obedience to some given exterior force. We are, however, very far from being in possession of the data requisite for the solution of this problem: and even if we were in possession of them, it is doubtful whether we should

be much farther advanced; as it might be extremely difficult to deduce any convenient practical results from the intricate and complex expressions which might stand at the foot of the investigation. The wisest philosophers have had their doubts with regard to every abstract theory concerning the motion of fluids; and the greatest geometers and analysts affirm that those methods, which have directed them to such curious and useful conclusions in the mechanics of solid bodies, do not furnish any conclusions with respect to fluids but such as are too general and uncertain for the greater number of particular cases. On these accounts a detailed exhibition of the theory alone would scarcely be of any utility: we shall, therefore, enter but little into the theoretical part of Hydrodynamics; but present merely a few propositions that are least dubious in their nature; and endeavour to supply the deficiency by stating the results of some of the most ingenious, careful, and satisfactory experiments with which we are acquainted.

I. On the Discharge of Fluids, through Apertures in the Bottom and Sides of Vessels; and on Spouting Fluids.

Prop. 1. If a fluid run through any tube, which is kept continually full, and the velocity of the fluid in every part of one and the same section be the same, the velocities in different sections will be inversely as the areas of the sections.

For as the tube is always equally full, the same quantity of fluid will run through every section in the same time: but the quantity passing through any section S with the velocity V in any given time, manifestly varies as S and V conjointly, or as $S \cdot V$; and, in like manner, the quantity passing through any other section s with velocity v, must vary as $s \cdot v$ in a given time: consequently we must have $S \cdot V = s \cdot v$, and $S : s :: v : V$.

It is supposed in this proposition that the changes in the diameters of the tube are continual, and no where abrupt so as to break the law of continuity in the sides of the tube: for if there be any angles, or considerable sinuosities, in the tube, they will produce eddies in the motion of the fluid, and the proposition will not obtain.

Prop. 2. If a fluid flowing through a very small orifice in the bottom of a vessel be kept constantly at the same height in the vessel, by being supplied as fast above as it runs out below, the velocity of the effluent fluid will be equal to that which a heavy body would acquire in falling freely through the height of the fluid above the orifice.

Let MNOP (fig. 1. pl. 87.) represent a vessel filled with a fluid up to the level GH; MP the bottom, in which is the aperture CD (very small compared with MP); CIKD the column of the fluid standing directly above the aperture, and CABD the lowest plate of the fluid immediately contiguous to the aperture. Also let v denote the velocity which a heavy body would acquire in falling freely through BD the height of the plate, and V the velocity acquired by the same plate during its descent through the same space until it is discharged by the pressure of the column CIKD. If we suppose the lowest plate of fluid ACBD to fall as a heavy body through the height BD, its moving force will be its own weight. Again, suppose it to be accelerated by its own weight, together with the pressure of the ambient fluid, about the column CIKD, that is, by the weight of the column CIKD, through the same space, that is, while it is accelerated from quiescence until it is actually discharged: then (by what has been shewn in Dynamics), the velocity in the former case will be to that in the latter, as the moving forces and the times in which they act directly, and the quantities of matter moved inversely. But the moving forces are to each other as the heights BD and KD; the times in which they act are inversely as the velocities, the space through which the body is accelerated being given; and the quantities of matter moved are equal: therefore, $v : V :: \frac{BD}{v} : \frac{KD}{V}$, whence $v^2 : V^2 :: BD : KD$, or $v : V :: \sqrt{BD} : \sqrt{KD}$. Now v is the velocity which a heavy body would actually acquire in falling through the space BD; consequently V the velocity of the effluent fluid is that which a heavy body would acquire in falling through KD, the whole altitude of the fluid above the orifice.

Cor. 1. In the same manner it may be shewn, that if a pipe be inserted horizontally in the vessel MNOP (fig. 2.) the plate of fluid ACBD will be discharged with the same velocity as before (if its centre of pressure be of the same depth), whatever be the thickness of the plate; this velocity not depending upon a continual acceleration through the length of the tube, otherwise the effluent fluid could not attain its full velocity until a column had been discharged whose base is equal to the orifice, and height equal to the length of the tube: whereas we find by experience that this full velocity can be attained by the thinnest plate which can be let escape from the aperture.

Cor. 2. The velocities and quantities discharged at different depths are as the square roots of the depths.

Cor. 3. The quantity run out in any time is equal to a cylinder, or prism, whose base is the area of the orifice, and its altitude the space described in that time by the velocity acquired by falling through the height of the fluid.

So that if h denote the height of the fluid,
a the area of the aperture,
g, $32\frac{1}{6}$ feet, or 386 inches,
and t the time of efflux,

we shall have for the quantity discharged . . $Q=at\sqrt{2gh}$;

Or, when a and h are in feet . . $Q=8\cdot0208\ at\sqrt{h}$, feet;

When a and h are in inches, . . . $Q=27\cdot7387\ at\sqrt{h}$, inch.

If the orifice is a circle whose diameter is d, then $\cdot785398\ d^2$ must be substituted for a;

And, when d and h are in feet . . $Q=6\cdot29952\ d^2t\sqrt{h}$, feet;

When d and h are in inches . . . $Q=21\cdot78592\ d^2t\sqrt{h}$, inch.

And from either of these it will be easy to find either a, t, or h, when the other three quantities are given.

Cor. 4. The force with which the effluent water impinges against any quiescent body, is proportional to the altitude of the fluid above the orifice.

For the force is as velocity × quantity of matter; but the quantity discharged in a given time is as the velocity: therefore the force is as the square of the velocity, that is, by the demonstration of the proposition, as the height of the fluid.

Cor. 5. The water spouts out with the same velocity, whether it be downwards or upwards, or sideways; because the pressure of fluids is the same in all directions at the same depth.

Cor. 6. Hence, if the adjutage be turned upwards, the jet will ascend to the height of the surface of the water in the vessel. And this is confirmed by experience, from which it appears that jets really ascend nearly to the height of the reservoir; the small quantity abated arising from the friction against the sides, the resistance occasioned by the oblique motion of the fluid in the bended pipe, and the resistance of the air.

Scholium. What is said in this proposition and corollaries, of the velocity of the effluent water, is true only of the middle filament of particles which issue through the centre of the aperture, which are supposed in theory to experience no retardation, and which, in fact, suffer no other retardation than what arises from the resistance of the air, and their mutual adhesion and attrition against each other. But those which issue near the edges of the aperture undergo a greater attrition, and therefore suffer a greater retardation. Hence it follows that the mean velocity of the whole column of effluent fluid will be considerably less than according to theory.

Sir Isaac Newton, who examined every subject that came before him with peculiar accuracy, first discovered a contraction in the vein of effluent water; and found, that at the distance of about a diameter of the orifice, the section of the vein contracted nearly in the subduplicate ratio of 2 to 1. Hence he concluded that the velocity of the water, after its exit from the aperture, was increased in this proportion, the same quantity passing in the same time through a narrower space. From the quantity of water discharged in a given time through that narrow section, he found that its velocity there was that which a heavy body would acquire in falling through the height of the water above the orifice; and since the velocity there was greater than immediately in the orifice, in the subduplicate ratio of 2 to 1, he concluded that the velocity of the effluent water in the orifice was equal to that which a heavy body would acquire in falling through half the altitude. But all this is true only of the mean velocity; for there is no cause which can actually accelerate the water after its exit from the orifice, whatever causes may contribute to its retardation. The manner in which the mean velocity of the water is increased after its discharge, though the actual velocity of the several particles continues unvaried, might be easily explained: but it need not be dwelt upon here. A circumstance of considerable importance in the escape of fluids through a horizontal orifice, seems to have been entirely neglected by most writers; we allude to a whirling motion: the fluid will revolve about the aperture, and at some distance from it, and escape with a revolving motion; the fluid rushes from all sides in spiral streams to supply the continual waste.

Prop. 3. When a vessel is left gradually to discharge itself by an orifice, in the bottom, if the area of the section parallel to the bottom be every where the same, the velocity of the surface of the fluid, and consequently the velocity of the efflux, will be uniformly retarded.

For the velocity of the descending surface is to the velocity at the orifice as the area of the orifice to the area of the surface, which is a constant ratio; consequently, the velocity of the descending surface varies as the velocity at the orifice, or as $\sqrt{h}$, by Cor. 2. of the last article; that is, the velocity of the descending surface varies as the square root of the space which it has to describe: so that this exactly corresponds with the case of a body projected perpendicularly upwards, where the velocity is as the square root of the space to be described: whence, as the retarding force is constant in the instance referred to, it must also be constant in the case before us, and the retardation uniform.

Comparing this with the instance just pointed out, we deduce these obvious corollaries:

Cor. 1. The quantities of water in a prismatic vessel discharged through an aperture in the bottom, decrease in equal times as the series of odd numbers 1, 3, 5, 7, 9, &c. taken in an inverted order.

Cor. 2. The quantity of water contained in an upright prismatic vessel, is half that

which would be discharged in the time of the entire gradual evacuation of the vessel, if the water be kept always at the same altitude.

Prop. 4. To determine the time of emptying a vessel of water by an orifice in the bottom of it; or in the side contiguous to the bottom, the height of the orifice being very small compared with the altitude of the fluid.

Let a=the area of the aperture;
h=the whole height of the fluid above the aperture;
x=the vertical space descended by the upper surface in any time t;
A=the area of the upper surface;
$g=32\frac{1}{6}$ as before, the measure of the force of gravity.

Then will the velocity of the effluent fluent at any time be represented, not by $\sqrt{2gh}$ as in Prop. 2, but by $\sqrt{2g(h-x)}$. This velocity will vary continually, because x increases, and the difference $h-x$ diminishes continually; but it may be regarded as constant during the indefinitely small time $\dot{t}$: so that in the time $\dot{t}$ there will escape through the orifice a prism of the fluid which has that orifice a for its base, and $\sqrt{2g(h-x)}$ for its altitude. Thus the quantity of fluid discharged during the instant $\dot{t}$ is $=a\dot{t}\sqrt{2g(h-x)}$. But during the same time the upper surface has descended through the space $\dot{x}$, and the vessel has lost a prism or cylinder of the fluid whose height is $\dot{x}$ and base A, that is, a prism whose capacity is $A\dot{x}$. Hence we have $A\dot{x}=a\dot{t}\sqrt{2g(h-x)}$;

and . . . . . $\dot{t}=\dfrac{A\dot{x}}{a\sqrt{2g(h-x)}}$ . . . . (I.)

As the area A will be given in functions of x, by the form of the vessel, the second member of this equation may be considered as containing only the variable quantity x; and it will be very easy in most cases, by simply finding the fluents, to discover the successive depressions and discharges of the fluid in any vessel of known form.

By way of application, take the following examples:

1. Let the vessel be an upright prism or cylinder. Here the area A will be constant, because every horizontal section of the prism will be equal to its base. Hence we have

$$t=\frac{A}{a\sqrt{2g}}\cdot\int\frac{\dot{x}}{\sqrt{h-x}}=-\frac{2A}{a\sqrt{2g}}\sqrt{h-x}+C.$$

Now when the time t is nothing, the depression of the upper surface A of the fluid is nothing also: thus we have at the same time $x=0$, and $t=0$; this condition determines the constant quantity $C=\dfrac{2A}{a\sqrt{2g}}\sqrt{h}$; and gives for the time of depressing the upper surface through the space x,

$$t=\frac{2A}{a\sqrt{2g}}\left(\sqrt{h}-\sqrt{h-x}\right) \; . \; . \; . \; . \; . \; \text{(II.)}$$

To find the time of completely emptying the vessel, we have only to make $x=h$, in which case the preceding expression will become . . . . $t=\dfrac{A}{a}\sqrt{\dfrac{2h}{g}}$.

Cor. The time just found is double that in which an equal quantity would be discharged, if the vessel were kept constantly full. For, in Prop. 2. Cor. 3. we have $Q=at\sqrt{2gh}$, where, if $Q=Ah$, we have $t=\dfrac{Ah}{a\sqrt{2gh}}=\dfrac{A}{a}\sqrt{\dfrac{h}{2g}}=\dfrac{A}{2a}\sqrt{\dfrac{2h}{g}}$, which is half the preceding value of t.

2. Let the vessel be any solid of rotation, of which the axis is vertical. Here A will be the area of a circle which has for its radius the ordinate y of the generating curve; that is, if $\pi=3{\cdot}141593$, we shall have $A=\pi y^2$. Introducing this value into the equation marked I, we have

$$t=\frac{\pi}{a\sqrt{2g}}\cdot\int\frac{\dot{x}y^2}{\sqrt{h-x}} \; . \; . \; . \; . \; \text{(III.)}$$

In any particular examples it will be necessary to put for y its value deduced in terms of x from the equation of the generating curve, and to find the fluents, which will be corrected by making at the same time $t=0$, and $x=0$.

3. Let the solid of rotation be a paraboloid with its vertex downwards. If p be the parameter of the generating parabola, the equation of the curve will be $y^2=pX$, when the origin of the curve is supposed at V, the point where we conceive the aperture to be; or if we transfer the origin to A, the equation will be $y^2=p(h-x)$: this substituted for y^2 in equation II. gives

$$t=-\frac{2\pi p}{3a\sqrt{2g}}\cdot(h-x)^{\frac{3}{2}}+C.$$

Determining the constant quantity as above directed, we obtain for the correct fluent.

$$t=\frac{2\pi p}{3a\sqrt{2g}}\cdot\left(h^{\frac{3}{2}}-\overline{h-x}^{\frac{3}{2}}\right) \; . \; . \; . \; . \; . \; . \; . \; \text{(IV.)}$$

If we make $h=x$, we have $t=\dfrac{2\pi p}{3a}\sqrt{\dfrac{h^3}{2g}}=\dfrac{2\pi y^2}{3a}\sqrt{\dfrac{h}{2g}}=\dfrac{S}{3a}\sqrt{\dfrac{2h}{g}}$; where S is the area of the upper surface of the fluid at the beginning of the exhaustion, and h the whole height.

The above may suffice as a specimen of the method, on the supposition that the velocity of efflux is that due to the *whole* height of the fluid. A very ingenious and complete paper on this subject, according to the hypothesis that the velocity is that due to *half* the height of the fluid above

the aperture, is given by Dr. Hutton in his Mathematical Miscellany.

Prop. 4. If a notch or sluice in form of a rectangle be cut in the vertical side of a vessel full of water, or any other fluid, the quantity of water flowing through it will be $\frac{2}{3}$ of the quantity which would flow through an equal orifice pl ced horizontally at the whole depth, in the same time; the vessel being constantly kept full.

Let ABCD (fig. 3. pl. 87.) be the vertical side of the reservoir, EFGH the rectangular notch in it, and let IL *i l* be a parallelogram of evanescent breadth. Then the velocity with which the water escapes at GH, is to the velocity with which it escapes through IL *i l*, as $\sqrt{\text{EG}}$ to $\sqrt{\text{EI}}$; and the quantities discharged in a given time through an evanescent parellelogram at the depth EG, and the evanescent parallelogram IL *i l*, are in the same ratio; that is, as GH to IK, the ordinates in a parabola EKH, whose axis is EG, and greatest ordinate GH. Therefore, the sum of all the quantities discharged through all the parallelograms IL *i l*, of which the rectangle EFGH is composed, is to the sum of all the quantities discharged through as many equal parallelograms IL *i l* at the depth EG, as the sum of all the elements IK *k i* of the parabola, to the sum of all the corresponding elements IL *l i* of the rectangle; that is, as the area of the parabola EKHG to that of the rectangle EFGH: or, the quantity running through the notch EFGH, is to the quantity running through an equal horizontal area placed at GH, as EKHG to EGHF; that is, as 2 to 3, by the nature of the parabola.

Cor. 1. The mean velocity of the fluid in the notch, is equal to two-thirds of that at GH.

Cor. 2. The quantity flowing through the rectangle ILHG, is to the quantity discharged through an equal rectangle placed horizontally at GH, as the parabolic zone IKHG is to the rectangle ILHG. As is evident from the demonstration of the proposition.

Prop. 5. To determine the relation between the time and the quantity of water, or other non-elastic fluid, discharged from a vessel through any vertical orifice; the velocity of the effluent fluid at any point being (as heretofore) supposed that due to the altitude of the upper surface of the fluid in the vessel above that point.

Let XYVZ (fig. 5. pl. 87.) be the vertical side of the vessel, and AM *s t* M′ a vertical orifice therein, of which the contour is a plane curve; SB a vertical line passing through A, the highest point of the orifice; and let MM′, *m m′*, be two horizontal lines indefinitely near the one to the other. Then, the upper surface of the fluid being supposed to pass through S, put $SA=h'$, $SB=h$, $AP=x$, $MM'=y$, the velocity $32\frac{1}{6}$ f. which gravity communicates at the end of a second $=g$, and the time $=t$: so shall $AB=h-h'$, and $Pp=\dot{x}$.

1. We propose first to ascertain what will be the discharge (q) at this orifice during a determinate time T, supposing the vessel is all that time kept full up to the level of S.

Now the velocity of the fluid discharged through the elementary trapezoid M M′ *m′m*, whose surface is $y\dot{x}$ may be considered, as that due to the height $SP=h'\times x$: consequently, if for a we substitute its value $y\dot{x}$, and for h its value in the first formula in Prob. 2. cor. 3. we shall have for the quantity discharged through that trapezoid in the time t,

$$t y \dot{x} \sqrt{2g(h'+x)}, \text{ or}$$
$$t \times y\dot{x}\sqrt{h'+x} \times \sqrt{2g}.$$

Therefore the quantity discharged during the time t through the portion of the orifice AMM′ is equal to

$$t\left(\textstyle\int y\dot{x}\sqrt{h'+x}+\mathrm{C}\right)\sqrt{2g}.$$

Thus taking the fluent contained between $x=0$, and $x=AB=h-h'$, we have for the quantity of efflux sought,

$$q=t\sqrt{2g}\left(\textstyle\int y\dot{x}\sqrt{h'+x}+\mathrm{C}\right) \;\ldots\ldots\; \text{(i.)}$$

Here it may be observed, that as the nature of the line which bounds the orifice is considered as known, we may always substitute for y a function of x, and in finding the fluent there will in fact be no other variable quantity than x; of course the constant quantity C will be determined by considering that when $x=0$, the quantity discharged is also $=0$. And when C is known, the whole quantity discharged is readily found by introducing into the value of the discharge through AMM′, for x its value $h-h'$.

Let s be such a height as if the fluid issued from all points of the orifice with the velocity due to that height, the total discharge through the orifice would be the same as has place naturally, conformably to equation i.; then will the velocity of the issuing fluid be $=\sqrt{2gs}$; and the discharge through the elementary trapezoid $MM'm'm=y\dot{x}$, in the time t, will be represented by $t\sqrt{2gs}\int y\dot{x}$: and since this ought to be equal to the value of q in equation i., we shall, by making that equality, and reducing, find

$$s=\frac{\left(\int y\dot{x}\sqrt{h'+x}+\mathrm{C}\right)^2}{\left(\int y\dot{x}+\mathrm{C}'\right)^2} \;\ldots\ldots\; \text{(ii.)}$$

The fluent of the denominator must manifestly be taken between the same values of x as that of the numerator; and the constant quantity C′ is determined by considering that when $x=0$ the portion $AMM'=0$ also.

The quantity s, which we have just shown how to determine, is generally called the mean height of the fluid above the orifice: the rule for finding this height is obviously nothing more than to divide the value of q

(found equa. i.), by the product of $t\sqrt{2g}$ into the surface of the orifice, and to square the quotient.

II. Let us enquire, secondly, into the relation between the time and the quantity discharged, supposing the vessel empties itself; that is, let us ascertain, according to this hypothesis, the quantity of fluid expelled during a given time.

This determination will evidently furnish, at the same time, the depression of the upper surface of the fluid in the vessel, of which the interior form is known; because the portion of the capacity of the vessel which is exhausted, is equal to the volume of fluid expelled at the orifice. Let us, in order to solve this branch of our general proposition, suppose that at the commencement of the motion the surface of the fluid is at S, and that at the end of the given time t it has descended to K: making SK$=z$, we shall have to obtain an equation between z, t, g, x, h, and h'. This may be accomplished thus: We conceive, at first, that the vessel is kept constantly full to the height K during the time t; and thence find, from what has just been done, for the discharge in that time, the value $t\sqrt{2g}\,(\int y\dot{x}\sqrt{h'+x-z}+\text{C})$. Since z is here supposed constant, it will be very easy to find the fluent of this expression; and it may be corrected as the former fluent, by the condition that when $x=0$ the discharge is likewise nothing; the whole fluent being found by taking $x=h-h'$.

The value of $t\sqrt{2g}\,(\int y\dot{x}\sqrt{h'+x-z}+\text{C})$ found in the manner just explained comprises only z and constant quantities: we next suppose that the vessel empties during the element of time $\dot{t}$, and that the surface Qq is depressed to Rr, through a distance K$k=\dot{z}$; which, if we put the section Qq of the vessel $=$S, gives for the quantity discharged S$\dot{z}$. Now, on this hypothesis, the descent through Kk may be imagined to take place with a uniform velocity, and the velocity at each point of the orifice to continue the same as when the fluid had its surface at K: therefore, since when the velocities are equal the quantities discharged vary as the times, we have this analogy,

$$t\sqrt{2g}\,(\int y\dot{x}\sqrt{h'+x-z}+\text{C}):\text{S}\dot{z}::t:\dot{t},$$

whence $\dot{t}=\dfrac{\text{S}\dot{z}}{(\int y\dot{x}\sqrt{h'+x-z}+\text{C})\sqrt{2g}}$

and the time

$$t=\frac{1}{\sqrt{2g}}\int\frac{\text{S}\dot{z}}{\int y\dot{x}\sqrt{h'+x-z}+\text{C}}+\text{C}' \quad . \; . \; . \; \text{(iii.)}$$

When the form of the vessel is known, S is given in functions of z, and of constant quantities; on the other hand, when the integration indicated by the denominator is effected, it contains likewise only the quantity z and invariable quantities: so that the complete value of t may be found by the integration of an expression which contains only the variable quantity z. The constant magnitude C′ will be determined from the consideration that when $z=0$, $t=0$.

Now it is known that fluents, such as those in equations (i.) and (iii.) of this proposition, which comprise, under the sign of integration, only one variable quantity and its fluxion, may always be referred to the rules for the quadrature of curves. In effect, let X be an expression composed of the variable quantity x and a constant quantity, the fluxion X$\dot{x}$ will be the element of the surface of a plane, terminated by a curve of which X will be the ordinate, x the corresponding abscissa, and $\int$X$\dot{x}$ the surface itself. Thus, granting the equation to be $y'=$X, and squaring the curve, which is designed by this equation, between a certain value of x, and another certain value of x, determined by the conditions of the case in hand, the resulting surface will be equivalent to the value of $\int$X$\dot{x}$ taken within suitable limits.

Let us now proceed to give a few examples of the application of the preceding formula to particular cases.

Ex. I. Suppose the vessel constantly kept full, and the orifice a rectangle whose sides are horizontal and vertical respectively.

Let the horizontal sides of the rectangle be each equal to b: putting this value instead of y in the equation (i.), and taking the fluents, we have

$q=tb\sqrt{2g}\times\frac{2}{3}(\overline{h'+x})^{\frac{3}{2}}+\text{C}$. The constant quantity, determined according to the method previously explained, will be $\text{C}=-h'^{\frac{3}{2}}$. Substituting this value of C for it, in the equation just given, it becomes $q=\frac{2}{3}bt\sqrt{2g}\,(\overline{h+x}^{\frac{3}{2}}-h'^{\frac{3}{2}})$. Then making, conformably to the directions under prop. 5, $x=h-h'$, we obtain for the total discharge through the orifice

$$\text{Q}=\tfrac{2}{3}bt\sqrt{2g}\,(h^{\frac{3}{2}}-h'^{\frac{3}{2}}) \quad . \; . \; . \; . \; . \; . \; \text{(iv.)}$$

If the theorem above be compared with the known rule for finding the area of a parabolic zone, it will thence appear that this value of Q furnishes the same result as cor. 2. a corroboration, if any were needed, of the theoretic truth of both expressions.

The mean height of the fluid, determined by the rule, will be found

$$s=\frac{4\,(h^{\frac{3}{2}}-h'^{\frac{3}{2}})^2}{9\,(h-h')^2}$$

Ex. II. Suppose the orifice a triangle whose vertex is uppermost, and the base horizontal, the vessel being constantly kept full.

Let the altitude of the triangle be to the base as m to 1, then is $y=mx$, and the equation (i.) will become

$$q = t\sqrt{2g}\left(\int m x \dot{x} \sqrt{h' + x} + C\right).$$

Making $h' + x = z$, we have $\dot{x} = \dot{z}$, and $x = z - h'$: whence arises $\int x \dot{x} \sqrt{h' + x} = \int (z - h') z^{\frac{1}{2}} \dot{z} = \int (z^{\frac{3}{2}} - h' z^{\frac{1}{2}}) \dot{z} = \frac{2}{5} z^{\frac{5}{2}} - \frac{2}{3} h' z^{\frac{3}{2}} + C = \frac{2}{5}(h' + x)^{\frac{5}{2}} - \frac{2h'}{3}(h' + x)^{\frac{3}{2}} + C$. The fluent vanishing when $x = 0$, we have $C = -\frac{2}{5} h'^{\frac{5}{2}} + \frac{2}{3} h'^{\frac{5}{2}} = \frac{4}{15} h'^{\frac{5}{2}}$, and the value of q becomes ... $q = m t \sqrt{2g}\left[\frac{2}{5}(h' + x)^{\frac{5}{2}} - \frac{2}{3} h' (h' + x)^{\frac{3}{2}} + \frac{4}{15} h'^{\frac{5}{2}}\right]$.

When $x = h - h'$, we have for the total discharge at the aperture

$$Q = \frac{2}{15} m t \sqrt{2g}\left(3h^{\frac{5}{2}} + 2h'^{\frac{5}{2}} - 5h'h^{\frac{3}{2}}\right) \ldots \text{(v.)}$$

The area of the triangular orifice is $\frac{1}{2} m (h - h')^2$, which is the value of $\int y \dot{x}$ taken with reference to the present instance.

Thus $t\sqrt{2g} \,.\int y \dot{x} = \frac{1}{2} m t \sqrt{2g}(h - h')^2$

whence, by the method pointed out before, we find the mean height of the fluid by the equation

$$s = \frac{16\left(3h^{\frac{5}{2}} + 2h'^{\frac{5}{2}} - 5h'h^{\frac{3}{2}}\right)^2}{225(h - h')^4} \;.\;. \text{(vi.)}$$

Ex. III. Let the orifice be a triangle, as in the preceding example, but having its vertex downwards, and its base horizontal.

In this case $y = m(h - h' - x)$, and, by a calculus little more difficult than the above, we shall find

$$Q = \frac{2}{15} m \sqrt{2g}\left(2h^{\frac{5}{2}} + 3h'^{\frac{5}{2}} - 5hh'^{\frac{3}{2}}\right) \ldots \text{(vii.)}$$

And the mean height of the fluid as below,

$$s = \frac{16\left(2h^{\frac{5}{2}} + 3h'^{\frac{5}{2}} - 5hh'^{\frac{3}{2}}\right)^2}{225(h - h')^4} \;.\;. \text{(viii.)}$$

Ex. IV. Suppose the orifice a circle, and the vessel kept constantly full.

The general theorem may be most readily applied to the present example, by an approximation which will be sufficiently accurate for practice, thus: Put $d =$ the diameter of the circle; then from the property of that figure $\frac{1}{2} y = \sqrt{dx - x^2}$, whence the general equation just referred to becomes

$$q = 2t\sqrt{2g}\int (dx - xx)^{\frac{1}{2}} (h' + x)^{\frac{1}{2}} \dot{x} + C).$$

Making $\int (dx - xx)^{\frac{1}{2}} (h' + x)^{\frac{1}{2}} \dot{x} = \int z \dot{x}$, the integration is reduced to the finding the area of a curve whose equation is $z = (dx - xx)^{\frac{1}{2}} (h' + x)^{\frac{1}{2}}$, its origin being at the point where $x = 0$. We may approximate to the quadrature of this curve by the method of equidistant ordinates, adopting the first general proposition in Sect. II. Part iv. of Hutton's Mensuration. To this end, suppose x divided into four equal parts; then shall we find the five ordinates corresponding to the points of division, by substituting, in the preceding equation, for z the values 0, $\frac{1}{4}x$, $\frac{1}{2}x$, $\frac{3}{4}x$, and x: these values found, we add to the sum of the first and fifth four times the sum of the second and fourth, and twice the third; one third of this latter sum, multiplied into the common distance between the ordinates, will be the approximate value of the surface $\int z \dot{x}$; which, multiplied into $2t\sqrt{2g}$, produces at length

$$q = \left\{\begin{array}{l} 2\left(\frac{1}{4}dx - \frac{1}{16}xx\right)^{\frac{1}{2}}\left(h' + \frac{1}{4}x\right)^{\frac{1}{2}} \\ + \left(\frac{1}{2}dx - \frac{1}{4}xx\right)^{\frac{1}{2}}\left(h' + \frac{1}{2}x\right)^{\frac{1}{2}} \\ + 2\left(\frac{3}{4}dx - \frac{9}{16}xx\right)^{\frac{1}{2}}\left(h' + \frac{3}{4}x\right)^{\frac{1}{2}} \\ + \frac{1}{2}(dx - xx)^{\frac{1}{2}}(h' + x)^{\frac{1}{2}} \end{array}\right\} \frac{1}{3} t x \sqrt{2g}.$$

If in this equation we make $x = d = h - h'$, and perform the requisite reductions, we shall have for the total discharge at the orifice

$$Q = td^2\sqrt{2g}\left(\frac{\sqrt{h + 3h'} + \sqrt{h' + 3h}}{4\sqrt{3}} + \frac{1}{6}\frac{\sqrt{h + h'}}{\sqrt{2}}\right) \quad \text{(ix.)}$$

This theorem may be reduced to computation in any particular case with tolerable facility. Had the number of equidistant ordinates been much increased, the additional accuracy of the approximation would not have compensated for the additional labour which would attend the resulting formula.

A rigorous integration would require the aid of infinite series. If r be the radius of the orifice; n the quotient of the distance of its centre from the upper surface of the fluid, divided by r; and $\pi = 3{\cdot}141593$; we should then have

$$Q = \pi t r^2 \sqrt{2grn} \times \left(1 - \frac{1}{32n^2} - \frac{5}{1024n^4} - \text{\&c.}\right. \quad \text{(x.)}$$

$$\text{and } s = rn\left(1 - \frac{1}{16n^2} - \frac{9}{1024n^4}\right. \text{\&c.} \ldots \text{(xi.)}$$

In both these series the first three terms are all which will be needed in practice.

Ex. V. To determine in what time t, the upper surface of the fluid shall be depressed through a vertical distance z, the vessel being supposed prismatic, and the orifice rectangular.

The section S of the vessel, and the breadth y of the orifice, are in this instance constant quantities. According to the method explained before, we first determine the quantity of fluid which would escape through the orifice during the time t, on the supposition that the vessel were kept full to the height $h' - z$, above the upper part of the orifice; for which purpose we must find the fluent of the expression $y \int \dot{x} \sqrt{h' + x - z}$, supposing z constant. This gives for the discharge sought $\frac{2}{3} y\, (h' +$

$x-z)^{\frac{3}{2}}\times C$. But this quantity being nothing when $x=0$, we have $C=-\frac{2}{3}y(h'-z)^{\frac{3}{2}}$, and the correct fluent is $\frac{2}{3}y\left[(h'+x-z)^{\frac{3}{2}}-(h'-z)^{\frac{3}{2}}\right]$. Extending this to the whole of the orifice by making $x=h-h'$, we shall have $\frac{2}{3}y\left[(h-z)^{\frac{3}{2}}-(h-z)^{\frac{3}{2}}\right]$: and if this value be substituted for $\int y\dot{x}\sqrt{h'+x-z}+C$, in the equa. iii. it will become

$$t=\frac{3\,S}{2y\sqrt{2g}}\cdot\int\frac{\dot{z}}{(h-z)^{\frac{3}{2}}-(h'-z)^{\frac{3}{2}}}\ldots.\ (\text{xii.})$$

If we put a for the altitude of the orifice, b for its breadth, and δ for the distance of the upper surface of the fluid from the bottom of the orifice, we shall have $\delta=h-z$; $\dot{z}=-\dot{\delta}$; $h=h'+a$; $h'=\delta-a$; and the preceding equation will be transformed to this:

$$t=\frac{-3\,S}{2b\sqrt{2g}}\cdot\int\frac{\dot{\delta}}{\delta^{\frac{3}{2}}-(\delta-a)^{\frac{3}{2}}}\ldots\ldots.\ (\text{xiii.})$$

The quantity which is found under the sign of integration in this equation is susceptible of being made rational; but the equation would be very complicated. The most easy method of obtaining a result is to square by approximation the curve, which for each value of δ has an ordinate equal to $\frac{1}{\delta^{\frac{3}{2}}-(\delta-a)^{\frac{3}{2}}}$, in the same manner as was adopted in the last article. Observing now that when $\delta=h$, $t=0$, the surface may be estimated between the limits $\delta=h$, and $\delta=a$; and as in this case we should only have the terms to transcribe from the preceding article, we trust we have no occasion to copy here the final equation.

If the altitude of the orifice a be equal to the height h of the vessel, the time of exhaustion to any variable depth z, reckoned from the bottom, would be equal to $t=\frac{3\,S}{b\sqrt{2g}}\times\frac{h\sqrt{z}-z\sqrt{h}}{h\,z}$: when $z=0$, this expression is infinite; that is, the time of complete exhaustion is infinite.

The student who wishes to pursue further this part of Hydrodynamics, may consult l'Hydrodynamique de M. Bossut, and the Select Exercises at the end of Dr. Hutton's Conics.

Prop. 6. If upon the altitude of the fluid in a vessel as a diameter, we describe a semicircle, the horizontal space described by the fluid spouting from a vertical orifice at any point in the diameter, will be as the ordinate of the circle drawn from that point, the horizontal space being measured on the plane of the bottom of the vessel.

When the aperture is vertical, and indefinitely small (as supposed here), the fluid will spout out horizontally with the velocity due to the altitude of the fluid above the orifice; and this velocity, combined with the perpendicular velocity arising from the action of gravity, will cause every particle, and consequently the whole jet, to describe the curve of a parabola. Now the velocity with which the fluid is expelled from any hole, as G (fig. 6. pl. 87.), is such as, if uniformly preserved, would carry a particle through a space equal to 2 BG in the time of the fall through BG: but, after quitting the orifice, it describes the parabolic curve, and arrives at the horizontal plane CF in the same time as a body would fall freely through GD; so that, to find the distance DE, since the times are as the roots of the spaces, we have this analogy, $\sqrt{GB}:\sqrt{GD}::$

$$2\,BG:DE=\frac{2\,BG\cdot\sqrt{GD}}{\sqrt{GB}}=2\sqrt{BG\cdot GD}=2\,GH,$$

by the nature of the circle. And the same will hold with respect to any other point in BD.

Cor. 1. If apertures be made at equal distances from the top and bottom of the vessel (kept full of the fluid), the horizontal distances to which the water will spout from these apertures will be equal. For when D g=BG, we shall have $2\sqrt{Bg\cdot gD}=2\sqrt{BG\cdot GD}$, and consequently DE the same in both cases.

Cor. 2. When the orifice is at the point bisecting the altitude of the fluid in the vessel, the fluid will spout to the greatest distance on the horizontal plane; and that distance, if measured on the plane of the bottom of the vessel, will be equal to the depth of fluid in it. For IK, the ordinate from the centre I, is the greatest which can be drawn in the semicircle; and DF, which is=2 IK, is then=2 BI=BD.

Cor. 3. Since the distance to which the fluid spouts depends upon the height of its surface AB above the orifice, and not in any degree upon the depth of the fluid below the orifice, it will follow, that whether the fluid in any vessel reaches down to any horizontal plane CF, or whether the bottom of the vessel stands at some higher point P, the distances DE, DF, to which the fluid will spout from the apertures G, I, will be the same; and the maximum distance will be when the fluid is expelled from an orifice half-way between the planes AB and CF. If the bottom of the vessel is higher than the point I, then the nearer to that point the orifice is placed, the greater will be the distance to which the fluid will spout on CF.

Cor. 4. Since the middle filament of particles issuing from an orifice in the side of a vessel, is discharged with the full velocity due to the entire altitude of the fluid above the orifice experiments made on the distance or height to which fluids spout will be found to agree very well with theory: but it by no means follows that all the filaments should be expelled with the same velocity; consequently, the quantity of the

fluid discharged in a given time may be less than that which would be discharged if all the filaments were expelled with the velocity due to the entire altitude; because this quantity depends on the mean velocity of all the filaments. Hence, therefore, we cannot infer (as several authors have done) from these experiments, compared with those which relate to the height or distance to which the fluid spouts, that the velocity of the water in the orifice is less than that which is due to the entire altitude; and that it is accelerated immediately after it gets out of it; because the distance to which the fluid spouts perpends upon the central filament only; but the quantity discharged on the mean velocity of the whole.

II. Account of Experiments made by different Philosophers on the Discharge of Water through Apertures and Tubes; and the practical Deductions from those Experiments.

The greater part of the propositions and theorems in the preceding section are founded upon the hypothesis, that the whole of the fluid particles issuing from a horizontal orifice in a vessel is expelled with the velocity due to the height of the fluid in the reservoir above that orifice; and the whole of the particles discharged through an evanescent horizontal element of a vertical aperture, with one and the same velocity. But this hypothesis, as we have hinted more than once, is not altogether consistent with fact. For, when water issues from an orifice, the particles will flow from all sides towards the orifice, with an accelerated motion, and in all directions. If the orifice be horizontal, that filament of particles which answers to its centre will, as Dr. M. Young observes, descend in a vertical line, and suffer no other resistance than that of the friction caused by the excess of its velocity above that of the collateral filaments, or by the retardation which arises from the attraction subsisting between them. The other filaments are soon compelled to turn from their vertical course, and to approach the orifice in spiral curves, and, when they arrive at it, their directions become more or less horizontal, according as they pass nearer to, or further from, the edge of the orifice. The motion, therefore, may be decomposed into two directions; the one horizontal, which is destroyed by the equal and contrary resistance of the filaments which are diametrically opposite; the other vertical, in proportion to which the quantity of water discharged is to be estimated. Hence it appears that the vertical velocity of the filaments decreases from the centre of the orifice to the circumference; and that the total discharge is less than if the filaments had issued vertically, as that filament does which corresponds to the centre of the orifice. It also follows that the filaments which are nearer to the centre, moving faster than those which are nearer to the edges, the vein of the fluid, after it has issued from the aperture (if that be circular) will form a conic frustrum whose greater base is the aperture; that is to say, its diameter will diminish to a certain distance, because the exterior filaments are gradually drawn on, in consequence of their mutual attraction, by the interior filaments whose velocity is greater, whence follows a diminution in the diameter of the vein.

This diminution in the section of the vein is often called the contraction of the vein; and the vein itself, from the orifice to the greatest diminution, is called the vena contracta, the contracted vein.

The contraction of the stream is found to take place not only when water is discharged from horizontal apertures, but when the discharge is from vertical apertures, or apertures inclined to the horizon in any manner whatever; in these latter cases, however, the form of the contracted vein is by no means so regular as in the discharge from horizontal orifices; the stream often assumes a very curious form, having for a small distance from the aperture the appearance of a plaited band.

When the orifice is horizontal and circular, the length of the contracted vein is very nearly equal to the semi-diameter of the orifice: and Polenus makes the ratio of the diameters of the contraction and of the aperture to be as $5\frac{1}{2}$ to $6\frac{1}{2}$; Bernoulli, 5 to 7; Chev. Du Buat, 6 to 9; Bossut, 41 to 50; Michelotti, 4 to 5; Venturi, nearly 4 to 5. And the latter author has shewn, by many experiments, that the contraction of the stream takes place at a greater distance under strong charges than in those which have but little elevation. The ratio of the surface of the section of the fluid vein at the place of greatest contraction, to the area of the orifice, does not much depend on the figure of the orifice; but this ratio is subject to variations to which we should have regard when the side or the bottom of the vessel is more or less thick, or when an additional tube is adapted to the orifice. The situation of the orifice with respect to the sides of the vessel has likewise a certain influence on the contraction; but the differences thus occasioned may be generally neglected in practice. We may infer from what has now been said, that to obtain formula which will furnish results applicable to practice we should, in the different cases, substitute for the actual area of the orifice the area of the smallest section of the contracted vein: this reduced area should be considered as the true orifice through which the discharge is made, and its vertical distance from the upper surface of the fluid as the height due to the velocity of the fluid issuing through this little orifice.

From the preceding remarks the necessity of giving extension to the theory of Hydro-

dynamics, by combining with it the results of experiments, must be pretty obvious: we shall in this chapter, therefore, give a concise view of the most useful conclusions deduced from the experiments of different philosophers, commencing with those of M. Bossut, whose experiments appear to have been very numerous, judicious, and exact.

We propose to determine from the experiments, first, what is the ratio between the area of the contraction of the vein and that of the orifice; secondly, the quantity of discharge through thin plates; thirdly, the discharge through additional tubes, their length being small compared with the depth of the water in the reservoir.

In M. Bossut's first experiments the apertures for the efflux of the water were all pierced perpendicularly in plates about ½ a line thick.

M. Bossut has given in his Hydrodynamique (tome II. pa. 47.) the following table relative to the discharge through orifices pierced in thin plates: the measure is the Paris foot royal, which is to the English foot as 1535 to 1440, or 1066 to 1000: the fourth column, which expresses the relation between the results of the experiments and those of the theory, is from M. Prony.

Constant altit. of the water in the reserv. above the apert. in Paris ft.	Theoret. discharges in 1^m, through a circul. apert. of tin, diameter expressed in cubic inches.	Real discharges in the same time through the same orifice, expressed also in cubic inc.	Ratio of actual to theor. discharges, the latter being denoted by unity.
1	4381	2722	0·62133
2	6196	3846	0·62073
3	7589	4710	0·62064
4	8763	5436	0·62034
5	9797	6075	0·62010
6	10732	6654	0·62000
7	11592	7183	0·61965
8	12392	7672	0·61911
9	13144	8135	0·61892
10	13855	8574	0·61883
11	14530	8990	0·61873
12	15180	9384	0·61819
13	15797	9764	0·61810
14	16393	10130	0·61795
15	16968	10472	0·61716

It appears from this table, that the actual discharges, as well as those resulting from the theory, are sensibly proportional to the square roots of the depths of fluid in the reservoir. Thus, for example, if we take the depths 4 and 9, whose square roots are as 2 to 3; the corresponding actual discharges taken from the third column, are 5436 and 8135: and these numbers are very nearly in the ratio of 2 to 3, the ratio being 2 to 2·9931.

If the numbers in the last column are multiplied together, and the 15th root of the last product taken, we shall have ·61982 for the true mean of the effective discharges, compared with the theoretic discharge 1; and the arithmetical mean between the numbers in the last column standing against the heights 7 and 8, is ·61938: the mean ratio between the actual and theoretic discharges, then, is not widely distant from that of ·62 to 1: whence it follows, from the remarks just given, that ·62 is the number by which we must multiply the real area of the orifice to obtain the area of the smallest section of the contracted vein.

Another set of experiments made by M. Bossut, with different apertures, are the following, in which the water was kept constantly at the altitude of 11 feet, 8 inches, 10 lines, from the centre of each aperture.

Exp.		No. of cubic inches furnished in 1 min.
1.	With an horizontal circular aperture, 6 lines diameter..........	2311
2.	With a circular horizontal aperture, 1 inch diameter..........	9281
3.	With a circular horizontal aperture, 2 inches diameter........	37203
4.	With a rectangular horizontal aperture, 1 inch by 3 lines..........	2933
5.	With a square horizontal aperture, the side 1 inch................	11817
6.	By a square horizontal aperture, the sides 2 inches..............	47361
	Constant height 9 feet.	
7.	Lateral circular aperture, 6 lines diameter.......................	2018
8.	Lateral circular aperture, 1 inch diameter.......................	8135
	Constant height 4 feet.	
9.	Lateral circular aperture, 6 lines diameter.......................	1353
10.	Lateral circular aperture, 1 inch diameter.......................	5436
	Constant height 7 lines.	
11.	By a lateral and circular orifice, 1 inch diameter..............	628

From the preceding experiments, we may make the following deductions:

1. 'The quantities of fluid discharged in equal times from different sized apertures, the altitude of the fluids being the same, are nearly to each other as the areas of the apertures.' Thus in the second and third experiments the areas of the apertures are as one to four, and the water discharged 9281 cubic inches to 37203 is nearly in the same ratio.

2. 'The quantities of water discharged, in equal times, by the same aperture, with different altitudes of the reservoir, are nearly as the square roots of the corresponding altitude of the water in the reservoir above the centre of the aperture.' Comparing together the eighth and tenth experiments, in which the respective altitudes of the reservoir were of 9 and 4 feet, of which the square roots are 3 and 2, we find the water

discharged by the first was 8195 cubic inches, the second 5436 cubic inches nearly in the proportion of 3 to 2, as before observed.

3. 'That, in general, the quantities of water discharged in the same time, by different apertures and under unequal altitudes of the reservoirs, are to each other in a compound ratio of the areas of the apertures and the square roots of the altitudes.

4. 'That, on account of the friction, the smallest apertures discharge less water than those that are larger and of a similar figure, the water in the respective reservoirs being at the same height.'

5. 'That of several apertures whose areas are equal, that which has the smallest circumference will discharge more water than the others, the water in the reservoirs being at the same altitude,' and this because there is less friction. Hence circular apertures are most advantageous, as they have less rubbing surface under the same area.

Hence, then, to make the formulæ in the theory, furnish such results as would agree with experiments, we must reduce the aperture a in those theorems in the ratio of ·62 to 1; or multiply the quantities resulting from the theorems as they now stand by the decimal ·62; or, lastly, if great accuracy be required, take, instead of the constant multiplier ·62, the number standing against the height of fluid in the reservoir above the orifice, in the last column of the table in the preceding article: thus, if the altitude of the fluid be 10 feet, the multiplier will be ·61883.

If the water, instead of flowing through an aperture pierced in a thin substance, passes through the end of a vertical tube of the same diameter as the aperture, there is a much greater discharge of water, because the contracted stream is greater in the first instance than in the second. In the following experiments the constant height of the water in the reservoir above the upper aperture of the tube was 11 feet 8 inches 10 lines, the diameter of the tube 1 inch.

Different lengths of the tube expressed in lines.			Number of cubic inches of water discharged in 1 minute.
	Lines		
Exp. 1	48	The stream filling the tube.	12274
2	24		12188
3	18		12168
4	18	The water not filling the tube.	9282

It appears, on comparing the first three experiments, that the longer the vertical tube is, the greater is the discharge of the water, because the contraction of the stream is less; it is, however, always somewhat contracted, even when it appears to fill the tube.

By comparing the quantities of water discharged in the third and fourth experiments, we find the two discharges, 12168, 9282, are to each other nearly in the proportion of 13 to 10; but we have seen that the water discharged through a thin aperture without any contraction in the stream, would be to the same aperture with a contracted stream as 1 to ·62, or as 16 to 10. From hence we may conclude, that, the altitude in the reservoir and the apertures being the same, the discharge through a thin aperture without any contraction in the stream, the discharge through an additional tube, and the discharge through a similar aperture with a contracted stream, are to each other nearly as the numbers 16, 13, 10: these proportions are sufficiently exact for practice. Hence it is plain that an additional tube only destroys in part the contraction of the stream, which contraction is greatest when the water passes through a thin aperture from a large reservoir.

If the additional tube, instead of being vertical, or placed at the bottom of the reservoir, was horizontal, or placed in the side, it would furnish the same quantity of water, provided it was of the same length, and that the exterior aperture was at the same distance from the surface of the water in the reservoir.

If the additional tube, instead of being cylindrical, was conical, having its largest base nearest the reservoir, it would discharge a greater quantity of water. The most advantageous form that can be given, in order to obtain the greatest quantity of water in a given time by a given aperture, is that which the stream assumes in coming out of the aperture; i. e. the tube must be of the form of a truncated cone, whose largest base should be of the same diameter as the aperture; the area of the small base should be to that of the larger base as 10 to 16; and the distance from one base to the other should be the semidiameter of the largest base; and the efflux of water will be as abundant as it would be through a thin aperture equal to the smallest base, and where the stream was not contracted. This form may be applied where it is necessary to obtain a certain quantity of water from a river, an aqueduct, &c. by a canal or lateral tube.

On comparing the efflux of water through additional tubes of different diameters, and with different altitudes of the water in the reservoirs, the following results were obtained; the additional tubes were two inches long, and were vertical and placed at the bottom of the reservoir:

	Constant altitude of the water above the tubes.	Diameter of the tubes expressed in lines.		Numb. of cube inch. in 1 min.
Ex. 1	3 feet 10 inches	6	Water filling the tude	1689
2		10		4703
3		6	The water not following the sides	1293
4		10		3598
5	2 feet	6	The water filling the tube	1222
6		10		3402
7		6	The water not filling the tube	935
8		10		2603

It results from these experiments, 1. "That the discharges by different additional tubes, with the same altitude of the reservoir, are nearly in proportion to the area of the apertures, or to the squares of the diameters. 2. That the discharges of water by additional tubes of the same diameter, with different altitudes of water in the reservoir, are nearly proportional to the square root of the altitude of the reservoir. 3. That in general the discharges of water in the same time, through different additional tubes, with different altitudes of water in the same reservoir, are to each other nearly as the product of the square of the diameters of the tubes by the square root of the altitude of the reservoirs." So that additional tubes, transmitting water, follow (among themselves) the same laws as through the thin orifice. The following table was formed from the foregoing experiments:

Constant altitude of the water in the reservoir above the aperture, expressed in feet.	Water discharged in one minute through a hole 1 inch diameter, the stream not contracted, in cubic inches.	Water discharged in one minute through an additional tube of 1 inch diameter, 2 inches long, in cubic inches.	Water discharged during 1 minute, through a hole 1 inch diameter, with a contracted stream, in cubic inches.	Ratio between the actual and the theoretic discharges, the latter being 1.
1	4381	3539	2722	0·81781
2	6169	5002	3846	0·80729
3	7589	6126	4710	0·80724
4	8763	7070	5436	0·80681
5	9797	7900	6075	0·80638
6	10732	8654	6654	0·80638
7	11592	9340	7183	0·80573
8	12392	9975	7672	0·80496
9	13144	10579	8135	0·80485
10	13855	11151	8574	0·80483
11	14530	11693	8990	0·80477
12	15180	12205	9384	0·80403
13	15797	12699	9764	0·80390
14	16393	13197	10130	0·80382
15	16968	13620	10472	0·80270

The mean of the numbers in the last column of this table is somewhat less than ·81 as a very good approximation to the truth: using it as a constant co-efficient in the formula for the value of Q given in an earlier prop. when we wish to know the discharge though a cylindric tube of the dimensions specified at the head of column the third. Thus we shall have $Q = \cdot 81\ a\ t \sqrt{2gh}$; the dimensions being all in feet, or all in inches.

We now pass to M. Bossut's experiments on the exhaustion of vessels (which have no extraneous supply) by little orifices.

The experiments upon the time of complete exhaustion of vessels which empty freely are not easy to make, at least in a conclusive manner: for, besides that in some cases the complete exhaustion would, according to the theory, require an unlimitted time, it is found that, when the surface of the water arrives within a small distance, as two or three inches, of a horizontal orifice, it forms above that orifice a conical or rather conoidal funnel, which diminishes the effect, and makes the conclusion of the discharge uncertain. It is best, therefore, not to make experiments upon the time of total discharge, but upon the time in which the upper surface is depressed through a certain vertical distance x, the greater the better, provided the upper surface has not sunk so low as to permit the formation of the funnel just spoken of.

It was shown (equa. II.) that when the primitive height of the water in a prismatic vessel was $= h$, the constant section of the vessel $= A$, the time t employed by the fluid to descend through the space x was expressed by this equation:

$$t = \frac{2\,A}{a\sqrt{2g}}(\sqrt{h} - \sqrt{h-x}).$$

Now when the orifice a is supposed pierced in a thin plate, we must substitute the contracted orifice ·62 a, and the formula will become

$$t = \frac{2}{\cdot 62 \times 8\cdot 0208}\frac{A}{a}(\sqrt{h} - \sqrt{h-x}) =$$

$$\cdot 40218\frac{A}{a}(\sqrt{h} - \sqrt{h-x}).$$

When the aperture is a circle, and its diameter d, we have $\cdot 785398\, d^2 = a$: this value of a substituted for it in the preceding equation gives

$$t = \cdot 51208\frac{A}{a}(\sqrt{h} - \sqrt{h-x}),$$

the dimensions being given in English statute feet; or if the dimensions are in terms of the Paris foot royal, then

$$t = \cdot 52852\frac{A}{a}(\sqrt{h} - \sqrt{h-x}).$$

This latter theorem may be applied to the experiments made by M. Bossut, in order to compare the results which it gives with those which are furnished by the experiments: the whole is comprised in the following table:

The constant section A of the vessel is 9 square feet. The primitive height h of the water is 11·667 Paris feet.	Diameter of the horizontal circular orifice, or value of d.	Depression of the water, or value of x.	Time of the depression of the water.	Time of the depression, calculated by the last theorem.
		Feet.	Seconds.	Seconds.
	·083333	4	445·5	443·04
		9	1224·5	1221·2
	·166666	4	112·	110·76
		9	306·	305·25

Hence we see that the difference between the results of the computation and those of the experiments are extremely small: much smaller indeed than might be expected, considering the many circumstances which may contribute to vary the times given by observation. So that we may regard the formulæ given in this article as sufficiently correct for practice; at least within the limit suggested by the formation of the conoidal funnel. What has been here said, applies principally to horizontal apertures; but it may be applied without fear of material error to small lateral orifices, when the fluid in the reservoir stands higher than the upper side of the orifice, and taking for the height h the distance of the centre of gravity of the orifice from the upper surface of the fluid.

Experimental Inquiries of Venturi.

The experiments and researches of M. J. B. Venturi, professor of natural philosophy at Modena, are neither so extensive nor so important as those of M. Bossut; but as he has noticed two or three curious circumstances relative to the motion of fluids, which seem to have escaped the observation of preceding philosophers, we shall present the reader with a concise account of the result of his inquiries.

I. In any fluid, those parts which are in motion carry along with them the lateral parts which are at rest.

To show the truth of this proposition, M. Venturi introduced a horizontal current of water into a vessel filled with the same fluid at rest. This stream entering the vessel with a certain velocity, passes though a portion of the fluid, and is then received in an inclined channel, the bottom of which gradually rises until it passes over the border or rim of the vessel itself. The effect is found to be, not only that the stream itself passes out of the vessel through the channel, but carries along with it the fluid contained in the vessel; so that after a short time no more of the fluid remains than was originally below the aperture at which the stream enters. This fact is adopted as a principle or primitive phenomenon by the author, under the denomination of the lateral communication of motion in fluids, and to this he refers many important hydraulic facts. He does not undertake to give an explanation of this principle, but shows that the mutual attraction of the particles of water is far from being a sufficient cause to account for it.

II. If that part of an additional cylindric tube which is nearest the side of the reservoir be contracted, according to the form of the contracted vein of fluid which issues through a hole of the same diameter in a thin plate, the expenditure will be the same as if the tube were not contracted at all; and the velocity of the stream within this tube will be greater than that of a jet through a thin plate in the ratio of 121 to 100.

III. The pressure of the atmosphere increases the expense of water through a simple cylindrical tube, when compared with that which issues through a hole in a thin plate, whatever may be the direction of the tube.

IV. In descending cylindrical tubes, the upper ends of which possess the form of the contracted vein, the discharge is such as corresponds with the height of the fluid above the inferior extremity of the tube.

V. In an additional conical tube the pressure of the atmosphere increases the expenditure in the proportion of the exterior section of the tube to the section of the contracted vein, whatever may be the position of the tube, provided its internal figure be adapted throughout to the lateral communication of motion.

VI. In cylindrical pipes the expenditure is less than through conical pipes, which diverge from the place of the contracted vein, and have the same exterior diameter.

For in the space between the inverted contracted vein and the sides of the cylinder eddies, or circular whirls, are produced, as in a basin which receives water by a channel; and these retard the efflux of the stream, and produce a corresponding failure in the effect.

VII. By means of proper adjutages applied to a given cylindric tube placed horizontally, it is possible to increase the expenditure of water through that tube in the proportion of 24 to 10, the charge or height of the reservoir remaining the same.

For this purpose the inner extremity of the tube AD (fig. 4. pl. 87) must be fitted at AB with a conical piece of the form of the contracted vein; this increases the expenditure as 12·1 to 10. Every other form will afford less. If the diameter at A be too great the contraction must be made beyond B, and the section of the vein will be smaller than the section of the tube. Secondly, at

the other extremity of the pipe BC apply a truncated conical tube CD, of which let the length be nearly nine times the diameter C, and its external diameter D must be 1·8 C. This additional piece will increase the expenditure as 24 to 12·1. So that the quantity of effluent water will be increased by the two adjutages in the ratio of 24 to 10. All this is on the supposition that the pipe BC has no elbows or sinuosities.

VIII. The expenditures out of a straight tube, a curved tube in a quadrantal arc, and an elbowed tube having the angle 90°, (each being posited horizontally) are cæt. par. nearly as 70, 50, and 45.

IX. The internal roughness of a pipe diminishes the expenditure, though the friction of the water against these asperities does not form any considerable part of the cause. A right-lined tube may have its internal surface highly polished throughout its whole length; it may every where have a diameter greater than the orifice to which it is applied; but, notwithstanding, the expenditure will be greatly diminished if the pipe should have enlarged parts, or swellings: for, by reason of these sudden changes in the interior dimensions of the pipe, much of the motion will be consumed in eddies. This, as M. Venturi remarks, is a very interesting circumstance, to which perhaps, sufficient attention has not been paid in the construction of hydraulic machines. It is enough that elbows and contractions are avoided; for it may happen, by an intermediate enlargement, that the whole advantage may be lost, which may have been procured by the ingenious dispositions of the other parts of the machine.

The above comprises what to us appeared most important in M. Venturi's researches, relative immediately to the subject of hydrodynamics. Those, however, who are desirous of seeing a more detailed account of this ingenious author's experiments may consult Mr. Nicholson's translation of his work "On the Lateral Communication of Motion in Fluids," sold by Taylor, Holborn.

Practical Conclusions of Mr. Eytelwein.

Mr. Eytelwein published at Berlin, in 1801, a treatise entitled Handbuch der Mechanik und der Hydraulik; from the second part of which, relative to hydrodynamics, we shall extract a few particulars.

I. In the chapter on the motion of water flowing out of reservoirs, and on the contraction of the stream, this gentleman makes the area of a section at the distance of about half its diameter from the orifice about $\frac{16}{25}$ of that of the aperture: hence the diameter is reduced to $\frac{4}{5}$. The quantity of water discharged is very nearly, but not quite, sufficient to fill this section with the velocity due to the height: for, finding more accurately the quantity discharged, the orifice must be supposed diminihsed to ·619, or nearly $\frac{5}{8}$. Hence the square root of the height may be multiplied by 5 instead of 8 (an approximate root of $64\frac{1}{6}$) for the mean velocity in a simple orifice.

II. If we apply the shortest pipe that will cause the stream to adhere every where to its sides, which will require its length to be twice its diameter; the discharge will be about $\frac{13}{16}$ of the full quantity, and the velocity may be found by taking $6\frac{1}{2}$ for a multiplier.

III. The greatest diminution is produced by inserting a pipe so as to project within the reservoir, probably because of the greater interference of the motions of the particles approaching its orifice in all directions: in this case the discharge is reduced nearly to a half.

IV. A conical tube approaching to the figure of the contraction of the stream procured a discharge of ·92, and when its edges were rounded off a discharge of 98, calculating on its least section.

V. Mr. Eytelwein is of opinion that the assertion of Venturi is too strong, and observes, that where the pipe is already very long scarcely any effect is produced by the addition of such a tube. He proceeds to describe a number of experiments made with different pipes, where the standard of comparison is the time of filling a given vessel out of a large reservoir, which was not kept always full, as it was difficult to avoid agitation in replenishing it; and this circumstance was perfectly indifferent to the results of the experiments. They confirm the assertion that a compound conical pipe may increase the discharge to twice and a half as much as through a simple orifice, or to more than half as much more as would fill the whole section with the velocity due to the height: but where a considerable length of pipe intervenes the additional orifice appears to have little or no effect.

VI. The first chapter concludes with a general table of the coefficients for finding the mean velocity of the water discharged by the pressure of a given head under different circumstances.

1. For the whole velocity due to the height, the coefficient by which its square root is to be multiplied is 8·0208.

2. For an orifice of the form of the contracted steam, 7·8.

3. For wide openings, of which the bottom is on a level with that of the reservoir; for sluices with walls in a line with the orifice; for bridges with pointed piers, 7·7.

4. For narrow openings, of which the bottom is on a level with that of the reservoir; for smaller openings in a sluice with side walls; for abrupt projections and square piers of bridges, 6·9.

5. For short pipes, from two to four times as long as their diameter, 6·6.

6. For openings in sluices without side walls, 5.

7. For orifices in a thin plate, 5·1.

VII. In the chapter on the discharge by rectangular orifices in the side of a reservoir,

extending to the surface, this author makes use of the same principles as we have adopted above, and shews that the quantity of water discharged may be found by taking two-thirds of the velocity due to the mean height, and allowing for the contraction according to the form of the opening.

On comparing the factors here deduced by Eytelwein from his researches, with those in our own account of Bossut's experiments, it will be found that there is no very great disagreement between them: though Bossut's manifestly claim the preference in point of accuracy. A further account of Eytelwein's labours (by Dr. T. Young) may be seen in Nicholson's Journal, Nos. 9, 10. N. S.

For an account of the results of Dr. Matthew Young, see our article APERTURE. And for other subjects connected with Hydrodynamics see the articles OSCILLATIONS *of the Sea*, PUMPS, WATER-WHEELS, RESISTANCE *of Fluids*, RIVERS, &c.

HYDROGEN, from ὕδωρ *water*, and γινομαι, *I am born*, so called, because it is one of the elements of that fluid, and is obtained from its decomposition. It is plentifully distributed throughout nature, and acts a very considerable part in the processes of the animal and vegetable economy. It is one of the ingredients in the formation of bitumen, oils, fats, ardent spirits, and in fact of all the proximate component parts of all animal and vegetable bodies. It enters into the composition of all animal and vegetable acids, and it is one of the bases of ammonia, and of various other compound gasses. By Mr. Davy, of the Royal Institution, and by several of the French chymists, it has been detected in several bodies, of which it was not before suspected to have formed a part; such as sulphur, phosphorus, charcoal, &c.

Its affinity for caloric is such, that it has never been procured, free from combination, in any other state than that of gas.

Hydrogenous, or hydrogen gas, is the lightest of all the gaseous fluids, being about 13 times lighter than common air. It was formerly termed, by Dr. Priestley and others, *inflammable air*, from its property of burning with flame when lighted in contact with the air; and some chymists, particularly Mr. Kirwan, have supposed it to be the same substance as that which Becher and his followers denominated phlogiston. It is certain that some of the effects of this gas, and those of the most dangerous kind, have for many ages been known among miners under the expressive name of the *fire-damp*. Though Dr. Mayew and Mr. Hales had succeeded in obtaining this gas from various substances, Mr. Cavendish ought more properly to be considered as its real discoverer, since it was he who first examined it, pointed out the difference between it and atmospheric air, and ascertained the greatest number of its properties. They were afterwards more fully investigated by Priestley, Scheele, Sennebier, and Volta.

Of the various methods of procuring this gas chymically, we shall point out two; the first of which is the most easy, and the second the most economical when great quantities are required. 1. Pour sulphuric acid, previously diluted with five or six times its weight of water, upon iron filings, or small pieces of zinc, in a small retort or flask, an effervescence will immediately take place, and hydrogen gas rises in bubbles, which may be collected in the usual manner over water, care being taken to allow a certain portion first to escape, that the atmospheric air which was previously in the retort may be prevented from mixing with the newly generated hydrogen gas. Second method. Into a gun-barrel, the breech of which has been removed that it may be open at both ends, put a quantity of iron wire coiled up in a spiral form, and place the barrel, with the wider end a little elevated, in a furnace in such a manner that both ends of it may be accessible: to the upper end of the barrel adapt a glass retort partly filled with water, and let the other be connected with a tube leading under water to the receiver of a pneumatic trough. When the apparatus is thus disposed and well luted, let the gun barrel be made red hot, and while in that state, apply a lamp to the retort; the steam of the water will pass over the red hot iron, and will be decomposed, the oxygen will unite with the wire, and the hydrogen be obtained abundantly in the form of gas, rising into the receiver.

Hydrogen gas, like all other airs, is invisible, elastic, expansible, and compressible. Its specific gravity, according to Kirwan, is ·00010; according to Lavoisier, ·000094; the variety was probably occasioned by the difference in purity of the specimens examined: it is the lightest substance whose weight we are able to estimate; and this levity peculiarly fits it for the purpose of filling air-balloons. See AEROSTATION. It is incapable of supporting combustion; all burning substances undergoing immediate extinction on being plunged into it. Though unfavourable to respiration, in such a degree that small animals are speedily killed by it, some persons have nevertheless respired it repeatedly without much inconvenience. Scheele tried the experiment, and Pilatre de Rozier confirmed it: the latter chymist breathed the gas from a bladder six or seven times in succession. To demonstrate that it was really hydrogen gas, he made a strong inspiration, and expired the air slowly through a long tube; on applying a lighted taper, the gas took fire, and continued to burn for some time. To shew that the gas was not diluted with common air, he mixed together one part of the latter and nine parts of the former, and having drawn the mixture into his lungs, he threw it out the same way. On the approach of a taper, the gas exploded in his

mouth, and almost stunned him. At first, he thought all his teeth had been driven out; but he fortunately received no injury. Fontana could only make three respirations with hydrogen gas, and even these produced extreme feebleness and oppression about the breast. Mr. Davy, after exhausting his lungs as completely as possible, found that he could not, without great difficulty, breathe this gas so long as half a minute. It produced uneasy feelings in the chest, momentary loss of muscular power, and sometimes a transient giddiness. But when he did not previously exhaust his lungs, he was able to breathe it so long as a minute without much inconvenience. When much diluted with common air, it may be breathed without injury. It is decomposed by living vegetables, and its basis, entering into the formation of the plant, becomes one of the constituents of oil, resin, &c.

Its inflammability is proved by Rozier's experiment, and by numerous other instances wherein a lighted body, or the electric spark, has been applied to it, in contact with atmospheric air, or with oxygen gas. The hydrogen gas, when inflamed, burns gradually away; if it be pure, it exhibits a lambent white, or rather blueish flame; but if the gas hold any substance in solution, which is often the case, the flame is tinged of different colours, according to the substance: it is most usually reddish, because the gas holds in solution a little charcoal. Dr. Thomson has found that the temperature at which the gas takes fire, is about 1000° of Fahrenheit's thermometer. Mr. Parkes relates that, being engaged in a process wherein a large quantity of hydrogen gas was evolved, and having incautiously brought a lighted candle too near the apparatus, the whole exploded with a tremendous crash, and several very large glass receivers, shattered into ten thousand pieces, were driven to every part of the laboratory.

The combustion of hydrogen gas has been observed to produce harmonious sounds in tubes of different kinds, and to give rise also to various other musical phœnomena. This fact has been noticed by Brugnatelli, Pictet, and Delarive; the two latter of whom have made many researches into the nature and modifications of these effects. If a current of inflamed hydrogen gas be introduced into a tube, the substance of which is elastic and sonorous, such as glass, metal, dry wood, &c. this tube, after the interval of some seconds, will admit a harmonic sound; if it be open at both extremities, the sound will be strong and full. The experiment may, however, succeed with a tube closed hermetically at one end, provided its diameter be so large as to admit of a circulation of the atmospheric air in sufficient quantity to maintain the combustion of the gas. The conditions essentially necessary for this purpose are, 1st. that the substance of the tube be elastic: a tube of paper or pasteboard will emit no sound. 2d. The flame must be produced by a current of hydrogen gas: an inflamed jet of the vapour of spirit of wine, or ether, a lighted taper, &c. are incapable of making the tube emit any sound. By changing the place of combustion, and thus by altering the position of the sonorous point, the sounds may be varied: this point is sometimes changed spontaneously during the process of combustion; and Pictet observed, that by means of the smoke with which he filled the tube, a continual succession of vibrations is produced. These curious properties are investigated at some length, though not to their full extent, in a paper of Delarive's, copied from the Journal de Physique, into the Phil. Mag. xiv. 24.

Hydrogen and oxygen gasses may be mixed together without alteration; but if a lighted taper be applied to the mixture, or an electric spark be passed through it, a rapid combustion and a violent explosion immediately ensue. A mixture of these two gasses may be made to produce the greatest heat yet known, by filling a bladder full of each, forcing some out of each into a common tube connected with both, and throwing a stream of the mixed gasses on burning charcoal or any other substance in the act of combustion. The connecting tube should have a very small orifice, and each bladder should be furnished with a stop-cock, that a regular stream of the mixed gasses may be produced. When these two gasses are mixed in the proportion of 85 parts of oxygen to 15 of hydrogen, and the mixture be made to explode, the gasses unite and form water. The same effect will be produced by a continued inflammation of hydrogen gas in common air, which may be performed in the following manner: Procure a glass globe, having two openings opposite to each other, let a bladder, having a stop-cock and tube, be filled with hydrogen gas; suffer the gas to escape, set fire immediately to the stream, and introduce the tube from which it issues into the centre of the globe; the air rushing in at the other opening, will be deprived by combustion of its oxygen, which will unite with the hydrogen gas and form water. The combustion may be continued, if required, till all the inflammable air is burnt; and drops of water will be observed running down the inside of the globe. The particulars of this and other processes for the composition of WATER, will be related more fully under that article. The explosion of a mixture of hydrogen gas with common air, is often resorted to as a test of the purity of the former: thus, when the bulk of a mixture of two parts of hydrogen gas and six parts of air, is reduced, by firing with the electric spark, to five parts, the former may be considered as pure; if only to six, it contains some foreign ingredients, and so on. To measure the diminution, the mixture is exploded in a glass tube, graduated, and closed at one end. See EUDIOME-

TRY. Berthollet may be considered as the inventor of this test. If hydrogen be placed in contact with water, from which all extraneous gasses are excluded, it remains unchanged; neither is it sensibly absorbed by water, unless pressure be applied, when that fluid may be made to absorb about one third part of its bulk of the gas, without, however, suffering any alteration of taste by the absorption. Charcoal has also the property of absorbing this gas, but in a smaller proportion than any other gas yet tried. New-made charcoal, allowed to cool without being exposed to the air, and then plunged into hydrogen gas, has been found to absorb about half its bulk of it.

Hydrogen gas dissolves sulphur, phosphorus, and carbon: the compounds thence resulting are termed SULPHURETTED, PHOSPHURETTED, and CARBURETTED *hydrogen gas*, respectively; to which terms, in their order, we refer for particulars with regard to the nature, formation, and use of the compounds they denote. With different proportions of the three substances abovementioned, hydrogen forms other compounds, which will be noticed in some of the following articles.

To what results respecting hydrogen and other bodies, and to what modifications of chymical theory, the interesting experiments of Mr. Davy may lead, remains yet to be seen: we shall not fail to trace their progress, and present accounts of them to our readers, as opportunities occur.

HYDROGEN GAS, arsenicated, was obtained by Scheele from the digestion of arsenic acid and zinc. Proust afterwards noticed it. The method of preparing it, recommended by Trommsdorf, by whom the gas has been analysed, and its properties ascertained, is to pour diluted sulphuric acid on a mixture of four parts of granulated zinc and one part of arsenic. The ascending gas, which may be collected and preserved in the usual manner, is rather more than half the weight of common air; it has the smell of garlic, extinguishes combustibles, and destroys life; it burns with a blue flame, the arsenic is deposited if the mouth of the phial be narrow; it explodes with oxygen gas, and yields by the explosion arsenic acid. It is decomposed by most of the acids, acid solutions of metals, and oil of turpentine. Dr. Stromeyer's process is to digest an alloy of fifteen parts of tin and one of arsenic with concentrated muriatic acid in a retort connected with the pneumatic apparatus; the gas is collected as usual in the jar. Nich. Jour. xix. 381.

HYDRO'GRAPHER. *s.* (ὕδωρ and γράφω.) One who draws maps of the sea (*Boyle*).

HYDRO'GRAPHY. *s.* (ὕδωρ and γράφω.) Description of the watery part of the terraqueous globe.

HYDRO'GURETS, substances formed by the union of hydrogen gas with such combustible bodies as were deemed simple when the name was imposed.

HYDROGURET OF SULPHUR, or HYDROGURETTED SULPHUR, according to Chenevix, is denominated by Kirwan, Super sulphuretted Hydrogen. Hydrogen gas is capable of uniting with two different proportions, or doses of sulphur; with the first it produces sulphuretted hydrogen, which will be described in its place, and when another dose of sulphur is added, the result is the compound of which we are now treating. It was first observed by Scheele; and Berthollet, who first examined its properties, has termed it, though not with precise accuracy, hydrogenated sulphur. It has the appearance of a yellow oil; and is easily decomposed by heat, or by exposure to the air when the sulphuretted hydrogen escapes, and the sulphur remains behind.

HYDRO'GURETTED SULPHURETS are combinations of different alkaline and earthy bases, with the substance described in the preceding article: in the writings of Berthollet, they are denominated Hydrogenated Sulphurets. The name we have adopted is that of Mr. Chenevix. We may avail ourselves of this opportunity of remarking that we do not mention all these diversified appellations for the purpose of filling our pages with difficult names; but for the sake of enabling the reader, especially the chymical student, to form clear and appropriate notions of the synonyma of the system, and of preventing him from mistaking those substances, to which, in the progress of chymistry and the improvement of its nomenclature, different names have been applied.

Hydroguretted Sulphuret of Barytes, may be procured by dissolving its sulphuret in water, or even by exposing it to the air. It has a green colour and an acid taste; but has no very strong action on other bodies.

Robiquet and Chevreul have remarked that on turning upside down a phial half-filled with this substance, in order to separate the crystals that had formed, a spontaneous decomposition of the liquid took place in a few days, and a separation of its principles into sulphuretted sulphite of barytes, and a solution of pure barytes in water. *Hydroguretted Sulphuret* of *Strontian* is prepared in the same manner as the preceding, and possesses very similar properties.

The compounds of which we have just given the generic appellation, are of considerable importance in chymical researches, and we shall therefore describe the principal species of them. In the old language of chymistry they were called *Hepars*, or *Livers*, of Sulphur.

HYDROGURETTED (or *Hydrogenated*) *Sulphuret* of Ammonia, formerly termed the *Fuming Liquor of Boyle*, because that Philosopher first described it. Berthollet

was the first who pointed out its nature. It is commonly prepared by distilling a mixture of five parts of sal ammoniac, five parts of sulphur, and six of quicklime.

It is a liquid of a red or rather deep orange colour, and exhales a fetid odour in consequence of an excess of ammonia which it contains. *Thomson.*

Hydroguretted Sulphuret of Potash or Soda, may be prepared by boiling together in water, a mixture of sulphur, and the alkali required; the compound salt which results from the action of the alkali upon the sulphur, is of a deep greenish yellow colour, has an acrid and very bitter taste, and acts upon most bodies with great energy. These salts are sometimes formed spontaneously by exposing the simple sulphuret to the air, or moistening it with water, by means of which it is furnished with hydrogen, which changes the properties of the former salt.

Hydroguretted Sulphurets, Metallic. In the opinion of Dr. Thomson, many of the compounds of metallic bodies with sulphur; ought to be comprehended in this denomination: he instances in the black sulphuret of mercury, *Ethiop's mineral;* many precipitations by hydrosulphuret of potash, as the black sulphurets of copper, iron, lead, nichel, cobalt, &c.; and some varieties of native sulphuret of antimony.

HYDROLAPATHUM, (*Hydrolapathum, i, n.* ὑδρολαπαθοι, from υδωρ, water, and λαπαθον, the dock). Herba Britanica. Lapathum aquaticum. The water dock. The leaves of this plant manifest considerable acidity, and are said to possess a laxative quality. The root is strongly astringent, and has been much employed, both externally and internally, for the cure of some diseases of the skin, as scurvy, lepra, lichen, &c. The root powdered is said to be an excellent dentifrice. See RUMEX.

HYDRO'LEA. In botany a genus of the class pentandria, order digynia. Calyx five-leaved; corol wheel-shaped; filaments heart-shaped at the base; capsula two-celled, two valved. Four species; herbaceous plants of the East and West Indies.

HY'DROMANCY. *s.* [ὕδωρ and μαντεία.] Prediction by water (*Ayliffe*).

HY'DROMEL, honey diluted in nearly an equal weight of water. When this liquor has not fermented, it is called simple hydromel; and when it has undergone the spirituous fermentation, it is called the vinous hydromel or mead. See MEAD.

HY'DROMETER, (from ὕδωρ and μετρον) an instrument contrived to measure the gravity, density, &c. of water and other liquids and fluids. There are various kinds of Hydrometers, we shall here describe two or three of the best.

Mr. Clarke constructed an hydrometer, shewing whether any spirits be proof, or above or below proof, and in what degree. This instrument was made of a ball of copper (because ivory imbibes spirituous liquors, and glass is apt to break), to which is soldered a brass wire about a quarter of an inch thick; upon this wire is marked the point to which it exactly sinks in proof spirits: as also two other marks, one above and one below the former, exactly answering to one-tenth above proof and one-tenth below proof. There are also a number of small weights made to add to it, so as to answer to the other degrees of strength besides those above, and for determining the specific gravities of different fluids. Philos. Trans. Abr. vol. vi. p. 326.

Dr. Desaguliers contrived an hydrometer for determining the specific gravities of different waters to such a degree of nicety, that it would shew when one kind of water was but the 40,000th part heavier than another. It consists of a hollow glass ball of about 3 inches in diameter, charged with shot to a proper degree, and having fixed in it a long and very slender wire, of only the 40th part of an inch in diameter, and divided into tenths of inches, each tenth answering to the 40,000 part, as above. See his Exper. Philos. vol. 2. p. 234.

Mr. Nicholson has made an improvement by which the hydrometer is adapted to the general purpose of finding the specific gravity both of solids and fluids, (fig. 7. pl. 87). A is a hollow ball of copper; B a dish affixed to the ball by a short slender stem D; C is another dish affixed to the opposite side of the ball by a kind of stirrup. In the instrument actually made, the stem D is of hardened steel, $\frac{1}{40}$ of an inch in diameter, and the dish C is so heavy as in all cases to keep the stem vertical when the instrument is made to float in any liquid. The parts are so adjusted that the addition of 1000 grains in the upper dish B, will just sink it in distilled water (at the temperature of 60° of Fahrenheit's thermometer), so far that the surface shall intersect the middle of the stem D. Let it now be required to find the specific gravity of any fluid. Immerse the instrument in it, and by placing weights in the dish B cause it to float, so that the middle of its stem D shall be cut by the surface of the fluid. Then, as the known weight of the instrument, added to 1000 grains, is to the same known weight added to the weights used in producing the last equilibrium, so is the weight of a quantity of distilled water displaced by the floating instrument, to the weight of an equal bulk, of the fluid under examination. And these weights are in the direct ratio of the specific gravities.

Again, let it be required to find the specific gravity of a solid body whose weight is less than 1000 grains. Place the instrument in distilled water, and put the body in the dish B. Make the adjustment of sinking the instrument to the middle of the stem, by adding weights in the same dish. Subtract those weights from 1000 grains, and

the remainder will be the weight of the body. Place now the body in the lower dish C, and add more weight in the upper dish B, till the adjustment is again obtained. The weight last added will be the loss the solid sustains by immersion, and is the weight of an equal bulk of water. Consequently the specific gravity of the solid is to that of water, as the weight of the body to the loss occasioned by the immersion. Mr. Nicholson says, "This instrument was found to be sufficiently accurate to give weights true to less than one-twentieth of a grain." Nicholson's Philosophy, vol. II. p. 16.

The hydrometer of Fahrenheit consists of a hollow ball, with a counterpoise below, and a very slender stem above, terminating in a small dish. The middle, or half length of the stem, is distinguished by a fine line across. In this instrument every division of the stem is rejected, and it is immersed in all experiments to the middle of the stem, by placing proper weights in the little dish above. Then as the part immersed is constantly of the same magnitude, and the whole weight of the hydrometer is known; this last weight, added to the weights in the dish, will be equal to the weight of fluid displaced by the instrument, as all writers on hydrostatics prove. And accordingly the specific gravities for the common form of the tables will be had by the proportion. As the whole weight of the hydrometer and its load, when adjusted in distilled water, is to the number 1,000, &c. so is the whole weight, when adjusted in any other fluid, to the number expressing its specific gravity.

In order to show the degree of accuracy an instrument of this kind is capable of, it may in the first place be observed, that the greatest impediment to its sensibility arises from the attraction or repulsion between the surface of the fluid and that of the stem. If the instrument be carefully wiped with a clean soft linen cloth, the metallic surface will be equally disposed to attract or repel the fluid. So that if it possess a tendency to descend, there will be a cavity surrounding the stem; or if, on the contrary, its tendency be to rise, the fluid will stand round the stem in a small protuberance. The operator must assist this tendency by applying the pincers, with which he takes up his weights to the rim of the dish. It is very easy to know when the surface of the fluid is truly flat, by observing the reflected image of the window, or any other fit object seen near the stem in the fluid. In this way the adjustment of the weights in the dish may, without difficulty, be brought to the fiftieth part of a grain. If, therefore, the instrument displace one thousand grains of water, the result will be very true to four places of figures, or even to five. This will be as exact as most scales are capable of affording.

Some writers have spoken of the adjustment of an hydrometer of this kind, so that it shall at some certain temperature displace one thousand grains of water, as if this were a great difficulty. It is true, indeed, that the performance of a piece of workmanship of this nature would require both skill and judgment in the artist; but it is by no means necessary.

Nothing more is required on the part of the workman, than that the hydrometer shall be light enough to float in ether, and capable of sustaining at least one-third of its own weight in the dish, without oversetting in a denser fluid. This last requisite is obtained by giving a due length to the stem beneath, to which the counterpoise is attached. With such an instrument, whatever may be its weight, or the quantity of water it displaces, the chymist may proceed to make his experiments, and deduce his specific gravities by the proportion before laid down. Or to save occasional computation, he may once for all make a table of the specific gravities, corresponding to every number of the load in the dish, from one grain up to the whole number of grains, so that by looking for the load in one column, he may always find the specific gravity in the column opposite.

This method is very ready and convenient in practice; but if it be preferred, the weights may be adjusted to the hydrometer, so as to show the specific gravity, without computation or reference. For this purpose the hydrometer must be properly counterpoised in distilled water, at the assumed standard temperature; suppose 60°, and the whole weight of the instrument and its load called 1,000, &c. Then the weight of the instrument and its load must be separately determined in grains and parts, or other weights, by a good pair of scales, and as the whole weight of the instrument and its load is proportioned to the weight of the instrument alone, so will be the number 1.000, &c. to a fourth term expressing the weight of the instrument in such parts as make the whole 1,000, &c. Make an actual set of decimal weights of which 1000, &c. shall be equal to the hydrometer and its load; and it is clear, that whatever may be the load in these weights, if it be added to the number denoting the weight of the instrument, the sum will denote the specific gravity of the fluid, wherein the instrument floats with that load.

By following the above easy method, it will be found that every hydrometer, wheresoever made, must give the same results. The subject is indeed in itself sufficiently simple, and would require scarcely any discussion, if it had not happened that many philosophers, for want of requisite attention, have made their experiments with hydrometers graduated on the stem by no certain rule by which operators, at a distance from each other, might compare their ex-

periments. The hydrometers, or pesé-liqueurs of Baumé, though in reality, comparable with each other, are subject, in part, to the defect, that their results, having no independent numerical measure, require explanation to those who do not know the instruments. Thus, for example, when a chymist acquaints us that a fluid indicated fourteen degrees of the pesé-liqueur of Baumé, we cannot usefully apply this result, unless we have some rule to deduce the correspondent specific gravity; whereas we should not have been in any respect at a loss, if the author had mentioned the specific gravity itself. As a considerable number of French philosophers refer to this instrument, it will be of use to explain its principles.

M. Baumé appears to have directed his attention chiefly to the acquisition of a means of making hydrometers with a graduated stem, which should correspond in their results, notwithstanding any differences in their balls or stems. There is little doubt but he was led into the method he adopted, by reflecting on that by which thermometers are usually graduated. See THERMOMETER.

As thermometers are graduated, independent of each other, by commencing with an interval between two stationary points of temperature, so M. Baumé adopted two determinate densities, for the sake of marking an interval on the stem of his hydrometer. These densities were those of pure water, and of water containing $\frac{15}{85}$ parts of its weight of pure dry common salt in solution. The temperature was ten degrees of Reaumer above freezing, or 54.5° of Fahrenheit. His instrument for salts was so balanced, as nearly to sink in pure water. When it was plunged in this saline solution the stem arose in part above the surface. The elevated portion was assumed to be fifteen degrees, and he divided the rest of the stem with a pair of compasses into similar degrees.

It is unnecessary to inquire in this place, whether this interval be constant, or how far it may be varied by any difference in the purity, and more especially the degree of dryness of the salt. Neither will it be requisite to inquire how far the principle of measuring specific gravities by degrees, representing equal increments, or decrements, in the bulk of fluids, of equal weight, but different specific gravities, may be of value, or the contrary. It does not seem probable, that Baumé's instrument will ever become of general use, for which reason nothing further need be ascertained, than the specific gravities corresponding with its degrees, in order that such experiments as have this element among their data may be easily understood by chymical readers.

M. Baumé, in his "Elemens de Pharmacie," has given a table of the degrees of his hydrometer for spirits, indicated by different mixtures of alcohol and pure water, where, he says, the spirit made use of gave 37 derees at the freezing point of water; and in a column of the table he states the bulk of this spirit, compared with that of an equal weight of water, as $35\frac{5}{8}$ to 30. The last proportion answers to a specific gravity of 0.842, very nearly. A mixture of two parts, by weight, of this spirit, with thirty of pure water, gave twelve degrees of the hydrometer at the freezing point. This mixture, therefore, contained $6\frac{1}{2}$ parts of Blagden's standard to 100 water; and by Gilpin's excellent tables, its specific gravity must have been 0.9915. By the same tables, these specific gravities of 0.842 and 0.9915 would, at 10° Reaumur, or 55° Fahrenheit, have fallen to 0.832 and 0.9905. Here then are two specific gravities of spirit corresponding with the degrees 12 and 37, whence the following table is constructed:

BAUME'S HYDROMETER FOR SPIRITS.
Temperature 55° Fahrenheit, or 10° Reaumur.

Deg.	Sp. Grav.	Deg.	Sp. Grav.
10 =	1.000	26 =	.892
11 =	.990	27 =	.886
12 =	.985	28 =	.880
13 =	.977	29 =	.874
14 =	.970	30 =	.868
15 =	.963	31 =	.862
16 =	.955	32 =	.857
17 =	.949	33 =	.852
18 =	.942	34 =	.847
19 =	.935	35 =	.842
20 =	.928	36 =	.837
21 =	.922	37 =	.832
22 =	.915	38 =	.827
23 =	.909	39 =	.822
24 =	.903	40 =	.817
25 =	.897		

With regard to the hydrometer for salts, the learned author of the first part of the Encyclopedie, Guyton de Morveau, who by no means considers this an accurate instrument, affirms, that the sixty-sixth degree corresponds nearly with a specific gravity of 1.848; and as this number lies near the extreme of the scale, we shall use it to deduce the rest.

BAUME'S HYDROMETER FOR SALTS.
Temperature 55° Fahrenheit, or 10° Reaumur.

Deg.	Sp. Grav.	Deg.	Sp. Grav.
0 =	1.000	39 =	1.373
3 =	1.020	42 =	1.414
6 =	1.040	45 =	1.455
9 =	1.064	48 =	1.500
12 =	1.089	51 =	1.547
15 =	1.114	54 =	1.594
18 =	1.140	57 =	1.659
21 =	1.170	60 =	1.717
24 =	1.200	63 =	1.779
27 =	1.230	66 =	1.848
30 =	1.261	69 =	1.920
33 =	1.295	72 =	2.000
36 =	1.333		

It may not be amiss to add, however, that in the Philosophical Magazine, Mr. Bingley, the assay-master of the Mint, has given the following numbers as the specific gravity of nitric acid, found to answer to the degrees of an areometer of Baumé by actual trial; temperature about 60° Fahrenheit. But his appears to have been a different instrument, as it was graduated only from 0 to 50°.

Deg.	Sp. Grav.	Deg.	Sp. Grav.
18	= 1.150	36	= 1.333
20	= 1.167	37	= 1.342
26	= 1.216	38	= 1.350
28	= 1.233	39	= 1.358
29	= 1.250	40	= 1.367
30	= 1.267	41	= 1.383
31	= 1.275	42	= 1.400
32	= 1.283	43	= 1.416
34	= 1.300	45	= 1.435
35	= 1.312		

One of the principal uses of the hydrometer in common life being to determine the specific gravity of vinous spirits on the mixtures of alcohol, which consist of water, an article of no value in a commercial light, and alcohol, which is of considerable price, it becomes of importance to determine how much of each may be contained in any mixture. The following tables, extracted from the large table of Gilpin in the "Philosophical Transactions," may be considered as of the first authority. They were made with mixtures of water and alcohol, of 0.825 at 60°. The alcohol was obtained from malt.

Real Specific Gravities of Spirits at different Temperatures.

Heat.	The pure spirit.	100 grains of spirit to 5 gr. of water.	100 grains of spirit to 10 gr. of water.	100 grains of spirit to 15 gr. of water.	100 grains of spirit to 20 gr. of water.	100 grains of spirit to 25 gr. of water.	100 grains of spirit to 30 gr. of water.	100 grains of spirit to 35 gr. of water.	100 grains of spirit to 40 gr. of water.	100 grains of spirit to 45 gr. of water.	100 grains of spirit to 50 gr. of water.
30°	.83896	.84995	.85957	.86825	.87585	.88282	.88921	.89511	.90054	.90558	.91023
35	83672	84769	85729	86587	87357	88059	88701	89294	89839	90345	90811
40	83445	84539	85507	86361	87134	87838	88481	89073	89617	90127	90596
45	83214	84310	85277	86131	86905	87613	88255	88849	89396	89909	90380
50	82977	84076	85042	85902	86676	87384	88030	88626	89174	89684	90160
55	82736	83834	84802	85664	86441	87150	87796	88393	88945	89458	89933
60	82500	83599	84568	85430	86208	86918	87569	88169	88720	89232	89707
65	82262	83362	84334	85193	85976	86686	87337	87938	88490	89006	89479
70	82023	83124	84092	84951	85736	86451	87105	87705	88254	88773	89252
75	81780	82878	83851	84710	85496	86212	86864	87466	88018	88538	89018
80	81530	82631	83603	84467	85248	85966	86622	87228	87776	88301	88781
85	81291	82396	83371	84243	85036	85757	86411	87021	87590	88120	88605
90	81044	82150	83126	84001	84797	85518	86172	86787	87360	87889	88376
95	80794	81900	82877	83753	84550	85272	85928	86542	87114	87654	88146
100	80548	81657	82639	83513	84308	85031	85688	86302	86879	87421	87915

Heat.	100 grains of spirit to 55 gr. of water.	100 grains of spirit to 60 gr. of water.	100 grains of spirit to 65 gr. of water.	100 grains of spirit to 70 gr. of water.	100 grains of spirit to 75 gr. of water.	100 grains of spirit to 80 gr. of water.	100 grains of spirit to 85 gr. of water.	100 grains of spir. to 90 g. of wat.	100 grains of spir. to 95 g. of wat.	100 gr. of spir. to 100 gr. of wat.
30°	.91449	.91847	.92217	.92566	.92889	.93191	.93474	.93741	.93991	.94222
35	91241	91640	92009	92355	92680	92986	93274	93541	93790	94025
40	91026	91428	91799	92151	92476	92783	93072	93341	93592	93827
45	90812	91211	91584	91937	92264	92570	92859	93131	93382	93621
50	90596	90997	91370	91723	92051	92358	92647	92919	93177	93419
55	90367	90768	91144	91502	91837	92145	92436	92707	92963	93208
60	90144	90549	90927	91287	91622	91933	92225	92499	92758	93002
65	89920	90328	90707	91066	91400	91715	92010	92283	92546	92794
70	89695	90104	90484	90847	91181	91493	91793	92069	92333	92580
75	89464	89872	90252	90617	90952	91270	91569	91849	92111	92364
80	89225	89639	90021	90385	90723	91046	91340	91622	91891	92142
85	89043	89460	89843	90209	90558	90882	91186	91465	91729	91969
90	88817	89230	89617	89988	90342	90668	90967	91248	91511	91751
95	88588	89003	89390	89763	90119	90443	90747	91029	91290	91531
100	88357	88769	89158	89536	89889	90215	90522	90805	91066	91310

Heat.	95 grains of spirit to 100 gr. of water.	90 grains of spirit to 100 gr. of water.	85 grains of spirit to 100 gr. of water.	80 grains of spirit to 100 gr. of water.	75 grains of spirit to 100 gr. of water.	70 grains of spirit to 100 gr. of water.	65 grains of spirit to 100 gr. of water.	60 gr. of spir. to 100 gr. of wat.	55 gr. of spir. to 100 gr. of wat.	50 gr. of spir. to 100 gr. of wat.
30°	.93447	.94675	.94920	.95173	.95429	.95681	.95944	.96209	.96470	.96719
35	94249	94484	94734	94988	95246	95502	95772	96048	96315	96579
40	94058	94295	94547	94802	95060	95328	95602	95879	96159	96434
45	93860	94096	94348	94605	94871	95143	95423	95705	95993	96280
50	93658	93897	94149	94414	94683	94958	95243	95534	95831	96126
55	93452	93696	93948	94213	94486	94767	95057	95357	95662	95966
60	93247	93493	93749	94018	94296	94579	94876	95181	95493	95804
65	93040	93285	93546	93822	94099	94388	94689	95000	95318	95635
70	92828	93076	93337	93616	93898	94193	94500	94813	95139	95469
75	92613	92865	93132	93413	93695	93989	94301	94623	94957	95292
80	92393	92646	92917	93201	93488	93785	94102	94431	94768	95111

Heat.	45 grains of spirit to 100 gr. of water.	40 grains of spirit to 100 gr. of water.	35 grains of spirit to 100 gr. of water.	30 grains of spirit to 100 gr. of water.	25 grains of spirit to 100 gr. of water.	20 grains of spirit to 100 gr. of water.	15 grains of spirit to 100 gr. of water.	10 grains of spirit to 100 gr. of water.	5 grains of spirit to 100 gr. of water.
30°	.96967	.97200	.97418	.97635	.97860	.98108	.98412	.98804	.99334
35	96840	97086	97319	97556	97801	98076	98397	98804	99344
40	96706	96967	97220	97472	97737	98033	98373	98795	99345
45	96563	96840	97110	97384	97666	97980	98338	98774	99338
50	96420	96708	96995	97284	97589	97920	98293	98745	.99316
55	96272	96575	96877	97181	97500	97847	98239	98702	99284
60	96122	96437	96752	97074	97410	97771	98176	98654	99244
65	95962	96288	96620	96959	97309	97688	98106	98594	99194
70	95802	96143	96484	96836	97203	97596	98028	98527	99134
75	95638	95987	96344	96708	97086	97495	97943	98454	99066
80	95467	95826	96192	96568	96963	97385	97845	98367	98991

See also the articles Areometer and Gravimeter.

Hydrometra, (*Hydrometra*, æ, f. ὑδρομητρα, from ὑδωρ, water, and μητρα, the womb). Dropsy of the womb. A genus of disease in the class cachexiæ and order intumescentiæ of Cullen. It produces a swelling of the hypogastric region: the fluctuation is very obscure. It must be considered as a very rare disease, and one that can with difficulty be ascertained.

HYDROMPHALUS, in surgery; a name given to any tumor in the navel, that contains water.

HYDROPHANES, Oculus Mundi, or Lapis Mutabilis, a kind of precious stone highly esteemed among the ancients, but little known to the moderns till Mr. Boyle made his observations upon it. Its specific gravity is about 2.048; its colour of an opaque whitish brown; it is not soluble in acids nor affected by alkalies, but is easily cut and polished. Sometimes it gives fire with steel, sometimes not. It is infusible per se; but when urged by a blow-pipe, changes to a brownish brittle substance. It is found in beds over the opals in Hungary, Silesia, and Saxony, and over the chalcedonies and agates in Iceland. These stones in general are either of a yellowish green, milky grey, or of a yellow like that of amber.

The most remarkable property of this stone is, that it becomes transparent by mere infusion in any aqueous fluid; but gradually resumes its opacity when dry. There are three of these stones in the British museum at London; the largest of them about the size of a cherry stone, but of an oval form.

HYDRO'PHILUS. In Zoology a genus of the class insectæ, order coleoptera. Antennas clavate, the club perfoliate; tentacles four, filiform; hind-legs formed, for swimming, fringed on the inner side, and nearly unarmed with claws. Thirty-one species: chiefly natives of Europe, a few of Asia and America: six indigenous to our own country.

The insects of this genus greatly resemble the beetle; and like the Drytiscus, which also resembles the beetle, they are inhabitants of ponds and stagnant waters, where they swim with much dexterity, and are able to turn round most rapidly: by night they rise into the air and fly abroad in quest of other water. The males are distinguished from the females by having a horny concave flap or shield on the forelegs, near the setting-on of the feet; the hind-legs are peculiarly fitted for their aquatic situation, being furnished on the inner side with a series of long and close set filaments, resembling a fin, by which they are enabled to swim with great ease and celerity; the larvæ remain about two and a half years before they change into pupœ, forming convenient cells, and secreting themselves in some bank; are extremely voracious and destructive to the more tender aquatic insects, worms and young fishes, which they ravenously seize with their forked jaws, and destroy by sucking out their juice.

The species most worthy of notice is the H. piceus, or water-clock: glossy-black; breast-channelled with a long spire pointing back-wards. It inhabits Europe and frequents our own country. The larva appears to have the legs seated on the upper part of the body near the back, but this is only occasioned by the peculiar shape and position of the legs. The female spins a flattish circular kind of web, terminated by a long tapering horn, from which the young escape as soon as they are hatched. See Nat. Hist. Pl. CXXXI.

HYDROPICAL, *a*, Dropsical.

Hydrophobia, (*Hydrophobia*, æ, f. ὑδροφοβια, from ὑδωρ, water, and φοβεω, to fear). Rabes canina. Canine madness. This genus of diseases arises in consequence of the bite of a rabid dog. It is termed hydrophobia, because persons that are thus bitten dread the sight or the falling of water when first seized. Cullen has arranged it under the class neuroses, and order spasmi.

And it is from Cullen's arrangement that the disease has of late passed under the name of hydrophobia. The term, however, is highly incorrect, for it implies a mere symptom, and that not always present in canine madness, and often present in other diseases. The Greek term *Lyssa*, which is now not in use, ought unquestionably to be revived and re-employed. Whether any other quadruped can originate this disease besides the dog seems doubtful. It is said to have originated occasionally with cats: but the cases referred to are few, and by no means decisive. To the dog it has been exclusively referred by all nations and in almost all ages.

It is known by the previous history of the disease, the dread of water, painful convulsions of the pharynx, and putrid fever.

HYDROPHORA. In Botany, a genus of the class cryptogamia, order fungi. Fungus bending back, paler underneath; cymes terminal like those of the guildenrose, composed mostly of radiate, abortive flowers; flowers green when young, and gradually changing to a beautiful rose-colour: petals generally four; stamens from six to ten; styles from one to three.

HYDRO'PHYLAX. In botany a genus of the class tetrandria, order monogynia. Coral one-petalled, funnel-form; calyx four-parted; capsule angular, two celled, with a transverse partition; seeds solitary. One species—a native of the sea coast of India, with red, fleshy, sweet, piliform root; coloured stem, clothed with long membranaceous sheaths; leaves opposite, ovate, entire; pale bue flowers axillary, and nearly sessile.

HYDROPHY'LLUM. Water-leaf. In botany a genus of the class petandria, order

monogynia. Corol companulate, with five longitudinal melliferous streaks on the inside; stygma cloven; capsule globular, two-valued. Two species natives of Virgina and Canada.

HYDROPIPER, (*Hydropiper, eris*, n. υδροπιπερις, from υδωρ, water, and πιπερις, pepper, so called from its biting the tongue like pepper, and being a native of marshy places). Biting arsmart. Lake weed. Water pepper. Polygonum hydropiper of Linnæus. This plant is very common in our ditches; the leaves have an acrid burning taste, and seem to be nearly of the same nature with those of the arum. They have been recommended as possessing anticeptic, aperient, diuretic virtues, and given in scurvies and cachexies, asthmas, hypochondriacal and nephritic complaints, and wandering gout. The fresh leaves have been applied externally as a stimulating cataplasm. See Polygenum.

HYDROPS, (*Hydrops, opis*, m. ὑδρωψ, from υδωρ, water). A dropsy. Any species of dropsy may be so termed, as hydrops abdominis, thoracis, cerebri, pericardii, testis, &c. See Ascites, Hydrothorax, Hydrocephalus, Anasarca, Hydrocele, Hydrocardia, &c.

HYDROPHTHA'LMIA, (*Hydropthalmia, æ*, f. υδροφθαλμια, from ὑδωρ, water, and οφθαλμος, the eye). There are two diseases different in their nature and consequences thus termed. The one is a mere anasarcous or œdematous swelling of the eyelid. The other, the true hydropthalmia, is a swelling of the bulb of the eye, from too great a collection of the vitreous or aqueous humours.

HYDRORA'CHITIS, (*Hydrorachitis, idis*, f. υδροραχιτις, from υδωρ, water, and ραχις, the spine). Spina bifida. A small, soft, fluctuating tumour, mostly situated on the lumbar vertebræ of new-born children. It is a genus of diseases in the class cachexiæ, and order intumescentiæ of Cullen, and is always incurable.

HYDROSARCA, (*Hydrosarca, æ*, f. υδροσαρκα, from ὑδωρ, water, and σαρξ, the flesh). Water in the cellular membrane. See Anasarca.

HYDROSARCOCE'LE, (*Hydrosarcocele. es*, f. υδροσαρκοκηλη, from ὑδωρ, water, σαρξ, the flesh, and κηλη, a tumour). Sarcocele, with an infuson of water into the cellular membrane.

HYDROSCOPE, an instrument anciently used for the measuring of time. The hydroscope was a kind of water-clock, consisting of a cylindrical tube, conical at bottom: the cylinder was graduated, or marked out with divisions, to which the top of the water becoming successively contiguous, as it trickled out at the vertex of the cone, pointed out the hour.

HYDRO'SIDORUM, a phosphuret of iron, for a short time supposed by Meyer and Bergmann, to be a new metal. See Iron.

HY'DROSTATIC, *Balance*. See Hydrostatics.

Hydrostatic *Paradox*. See Hydrostatics.

HY'DROSTATICAL. *a*. (ὑδωρ and ςατικη). Relating to hydrostatics. (*Bentley*).

HYDROSTATICALLY. *adv*. According to hydrostatics (*Bentley*).

HYDRO'STATICS, is that branch of physico-mathematical science which comprises the doctrine of the pressure and the equilibrium of non-elastic fluids, and that of the weight, pressure, stability, &c. of solids immersed in them.

Def. A fluid is a body whose parts are very minute, yield to any force impressed upon it (however small), and by so yielding are easily moved among themselves.

This is nearly the same as the definition given by Newton, in the Principia, book 2. sect. 5. and is adopted here because, in conjunction with two or three established facts, it may serve as a basis for all which distinguishes the doctrines of hydrostatics from those of pure mechanics. The writers on the continent, however, though they admit that the minuteness of fluid molecuæ, and their excessive mobility, are characteristics common to all such bodies, yet they have recourse to a different definition. Thus the celebrated Euler in the New Commentaries of St. Petersburgh, vol. 13. takes for the basis of his analysis the following consideration: "The distinguishing nature of fluids consists in this property, namely, that when it is subjected to any pressure whatever that pressure is so distributed throughout the mass, that while it remains in equilibrio all its parts are equally pressed." And M. D'Alembert in his Traite de l'Equilibre et du Mouvement des Fluides, as well as M. Prony in his Architecture Hydraulique, adopt the same property as a definition. It is extremely consistent with experiment (though, as will soon be seen, it is rather a proposition, capable of proof, than a definition), and furnishes a natural foundation for an algebraical calculus, by which the whole doctrine of hydrostatics may be exhibited in a few equations. But this method, though it possesses some advantage, is not entirely pursued here, from a firm conviction that a judicious combination of the geometrical and algebraical methods is far more likely to convey distinct ideas to the student than the modern analysis merely.

Perfect fludity, according to the Newtonian system, arises from a want of any sensible cohesion between the constituent particles of the fluid and this want of cohesion is commonly attributed to the spherical figure of the particles. The nature of this work does not require that we should enter into minute disquisitions on the formal cause of fluidity. We shall merely state that the late Dr. Black, of Edinburgh, speaks of fluidity as an effect of heat: and before him Boerhaave pleaded strenuously for the same opinion. According to this view of the

matter, fluidity may be caused by a certain degree of fire, which, when employed for this purpose, seldom manifests itself by any other perceptible effect: not dilating the volume, but resisting the particular attachment of the parts. Some strive to give mechanical ideas of a fluid body, by comparing it to a heap of sand: but the impossibility of giving fluidity by any kind of mechanical comminution will appear by considering two of the circumstances necessary to constitute a fluid body: 1. That the parts, notwithstanding any compression, may be moved in relation to each other, with the smallest conceivable force, or will give no sensible resistance to motion within the mass in any direction. 2. That the parts shall gravitate to each other, whereby there is a constant tendency to arrange themselves about a common centre, and form a spherical body; which, as the parts do not resist motion, is easily executed in small bodies. Hence the appearance of drops always takes place when a fluid is in proper circumstances. It is obvious that a body of sand can by no means conform to these circumstances.

Different fluids have different degrees of fluidity, according to the facility with which the particles may be moved amongst each other. Water and mercury are classed among the most perfect fluids. Many fluids have a very sensible degree of tenacity, and are therefore called viscous or imperfect fluids.

Def. Fluids may be divided into compressible and incompressible, or elastic and non-elastic fluids. A compressible or elastic fluid is one whose apparent magnitude is diminished as the pressure upon it is increased, and increased by a diminution of pressure. Such is air, and the different vapours. An incompressible or non-elastic fluid is one whose dimensions are not, at least as to sense, affected by any augmentation of pressure. Water, mercury, wine, &c. are generally ranged under this class. By many modern writers the term *fluid* is confined to those which are compressible, and *liquid* to such as are incompressible.

Although the use of that well-known instrument the thermometer is founded upon the circumstance of different degrees of heat and cold causing a corresponding dilatation or condensation in spirits of wine, mercury, and some other fluids; a fact which it might be supposed would have led to the opinion that such fluids were compressible by other means; yet has it been universally believed and asserted till within the last half century, that after the fluid was freed from all air no art or violence could press it into less space. This opinion has been grounded chiefly, if not altogether, on a gross and inadequate experiment made by the Academi del Cimento, at Florence; in which water when violently squeezed made its way through the fine pores of a globe of gold, rather than yield to the compression. Even so lately as 1790, so skilful a mathematician and philosopher as M. Prony speaks of the incompressibility of water with an obvious allusion to the Florentine experiment, as though he was not at all conscious of its insufficiency, and seeming quite ignorant of any contrary experiments. For, says he, "Si une quantité d'eau est renfermée dans un vase de capacité et de forme quelconque, et qu'on l'y comprime avec toute la force qu'on voudra, jamais on ne pourra la reduire à occuper un espace moindre que celui qu'elle occupoit d'abord. Tout le monde connoît les experiences qu'on a faites pour constater cette propriété; on sait que l'eau etant renfermée dans des globes de métal, quelque percussion ou quelque pression qu'on emploie pour le faire diminuer de volume, on n'y parvient jamais, et que lorsque la résistance qu'elle oppose à de pareils efforts ne lui fait pas briser, son enveloppe, elle se fait jour à travers les pores du métal, d'où elle sort en forme de rosée."

But our ingenious countryman, Mr. Canton, attentively considering this experiment, found that it was not sufficiently accurate to justify the conclusion which had always been drawn from it; since the Florentine philosophers had no method of determining that the alteration of figure in their globe of gold occasioned such a diminution of its internal capacity as was exactly equal to the quantity of water forced into its pores. To bring this matter therefore to a more accurate and decisive trial, he procured a small glass tube of about two feet long, with a ball at one end, of an inch and a quarter in diameter. Having filled the ball and part of the tube with mercury, and brought it exactly to the heat of 50° of Fahrenheit's thermometer, he marked the place where the mercury stood in the tube, which was about six inches and a half above the ball; he then raised the mercury by heat to the top of the tube, and there sealed the tube hermetically; then upon reducing the mercury to the same degree of heat as before, it stood in the tube $\frac{32}{100}$ of an inch higher than the mark. The same experiment was repeated with water exhausted of air instead of mercury, and the water stood in the tube $\frac{43}{100}$ of an inch above the mark. Since the weight of the atmosphere on the outside of the ball, without any counterbalance from within, will compress the ball, and equally raise both the mercury and water, it appears that the water expands $\frac{11}{100}$ of an inch more than the mercury by removing the weight of the atmosphere. Having thus determined that water is really compressible, he proceeded to estimate the degree of compression corresponding to any given weight. For this purpose he prepared another ball, with a tube joined to it; and finding that the mercury in $\frac{23}{100}$ of an inch of the tube was the hundred thousandth part of that contained in the ball, he divided the tube accordingly. He then filled the ball, and part of the tube with water ex-

hausted of air; and leaving the tube open, placed this apparatus under the receiver of an air-pump, and observed the degree of expansion of the water answering to any degree of rarefaction of the air: and again by putting it into the glass receiver of a condensing engine, he noted the degree of compression of the water corresponding to any degree of condensation of the air. He thus found, by repeated trials, that, in a temperature of 50°, and when the mercury has been at its mean height in the barometer, the water expands one part in 21740; and is as much compressed by the weight of an additional atmosphere; or the compression of water by twice the weight of the atmosphere, is one part in 10870 of its whole bulk. Should it be objected that the compressibility of the water was owing to any air which it might be supposed to contain, he answers, that more air would make it more compressible; he therefore let into the ball a bubble of air, and found that the water was not more compressed by the same weight than before.

In some further experiments of the same kind, Mr. Canton found that water is more compressible in winter than in summer; but he observed the contrary in spirit of wine, and oil of olives.

The following table was formed, when the barometer was at 29 inches and a half, and the thermometer at 50 degrees.

Compression of	Millionth parts.	Spec. grav.
Spirit of wine	66	846
Oil of olives	48	918
Rain water	46	1000
Sea water	40	1028
Mercury	3	13595

See Phil. Transac. for 1762 and 1764.

Indeed it seems reasonable to conclude, independent of all experiments, that no fluids are absolutely incompressible: for all bodies being porous, their parts may be brought nearer to each other; and a liquid being an assemblage of solid bodies, should, therefore, be compressible. Hence, then, the usual distinction of fluids into compressible and incompressible is, strictly speaking, inaccurate. Nevertheless, as the compression of the liquids in the preceding table is very small compared with their mass, it may safely be neglected in most practical cases, so that the fluids usually considered as incompressible may still be reckoned so in the investigations we are about to enter upon; and the consideration of air, and other easily compressible and elastic fluids, may be properly referred to the separate head of Aerostatics or Pneumatics.

We know so little of the essential nature and constitution of fluids, that it would be by no means advisable to apply to them the principles of equilibrium and of motion, as they have been stated in the articles Dynamics, &c., without first inquiring whether there is not some other general law which appertains to fluids only, and from which, in conjunction with the principles just adverted to, the doctrines of hydrostatics may readily be deduced. For the action of fluids upon each other, differs so essentially in some particulars from the mutual actions of solid bodies, that some distinct principle must be sought, to account for such varying effects. The parts of a solid are so connected together as to form but one and the same whole; their effort is, according to its nature, concentrated into one point (as the centre of gravity, centre of gyration, &c.); which is by no means the case with fluids, their particles being extremely moveable, and entirely independent of each other. Again: no statical equilibrium can take place between two bodies of different weights, unless the lighter body acts at some mechanical advantage; whereas a very small weight of fluid may, without acting in so advantageous a position, be made to balance any weight however large. Solid bodies, again, when left to themselves, press only in the direction of gravity; while fluids press equally in all directions. This property indeed is one of the most extraordinary which we meet with in fluids, and from it most of the other properties may be readily inferred; on which account the continental philosophers assume it as a kind of definition. The Newtonian definition is more simple, and naturally leads to this property, which can only be conceived to arise from the extreme freedom with which the particles move amongst each other. But the most satisfactory proof results from experiment; to which it is proper to have recourse in the establishment of the first principles of hydrostatics, and which will at once furnish the general law necessary to be combined with the received principles of proper mechanics.

Def. The specific gravity of any solid or fluid body is the absolute weight of a known volume of that substance, namely, of that which we take for unity in measuring the capacities of bodies.

Comparing this definition with that of density, it will appear that the two terms density and specific gravity express the same thing under different aspects; the former being more accurately restrained to the greater or less vicinity of particles, the latter to a greater or less weight in a given volume; hence as weight depends upon the closeness of particles, the density varies as the specific gravity, and the terms may in most cases be indiscriminately used. The specific gravities of fluids are usually considered without any regard to the empty spaces between the particles; though, if the particles of fluids are spherical, the vacuities make at least $\frac{1}{4}$ of the whole bulk. But it is sufficient that we know precisely in what sense the specific gravity of fluids is understood. See Gravity, *Specific.*

On the Pressure of non-elastic Fluids.

Prop. The upper surface of a homogeneous heavy fluid in any vessel, or any system of communicating vessels, is horizontal.

This is a matter of universal experience; and, as it is easily observed, may be taken for the distinguishing property of fluids. Thus, if ABCDEF (fig. 9. pl. 87.) be a vessel in which the branches CDH, EFG, have a free communication with the part AB; then, if water, or mercury, or wine, or any other fluid commonly reckoned non-elastic, be poured in, either at A, C, or E, and when the whole is at rest, the surface of the fluid stands at IK in the larger trunk; if the line LIKM be drawn parallel to the horizon, the surface of the fluid will stand at L in the branch EF, and at M in the branch CD; and this whatever are the inclinations of those branches, or the angles at F and D, G and H.

Remark. This is usually explained by saying, that, since the parts of a fluid are easily moveable in any direction, the higher particles will descend by reason of their superior gravity, and raise the lower parts till the whole comes to rest in a horizontal plane. Now what is called the horizontal plane is, in fact, a portion of a spherical surface, whose centre is the centre of the earth: hence it will follow, that if a fluid gravitate towards any centre, it will dispose itself into a spherical figure, the centre of which is the centre of force.

Prop. If a fluid, considered without weight, is contained in any vessel whatever, and an orifice being made in the vessel, any pressure whatever be applied thereto, that pressure will be distributed equally in all directions.

Through any point N (fig. 9.) taken at pleasure below the surface of the fluid LIKM, imagine the horizontal plane PNOQ to pass. It is obvious the weight of the fluid contained in the vessel below PNOQ contributes nothing to the support of the columns LP, IO, MQ; so that the equilibrium would obtain in like manner if the fluid contained in that part of the vessel below PNOQ had lost its weight entirely. We may, therefore, regard this fluid as being solely a mean of communication between the columns LP, IO, and MQ; in such manner that it will transmit the pressure resulting from the columns LP, MQ, to the column IO, and reciprocally. If now, instead of the column LP, IO, MQ, of the fluid, pistons were applied to the surfaces P, NO, and Q, and were separately urged by pressures respectively equal to the pressures of the columns LP, IO, MQ, the equilibrium would manifestly obtain in like manner. Or, if a pressure equal to that of the column MQ be applied at Q, while the columns LP, IO, remain, the equilibrium will still obtain; and this whatever are the directions of the several branches, and their sinuosities at D, F, &c. whence the proposition is evident.

Cor. Not only is the pressure transmitted equally in all directions, but it acts perpendicularly upon every point of the surface of the vessel which contains the fluid.

For, if the pressure which acts upon the surface were not exerted perpendicularly, it is easy to see that it could not be entirely annihilated by the reaction of that surface; the surplus of force would, therefore, occasion fresh action upon the particles of the fluid, which must of consequence be transmitted in all directions, and thus necessarily occasion a motion in the fluid: that is, the fluid could not be at rest in the vessel, which is contrary to experience.

Cor. 2. Hence, also, if the parts of a fluid contained in any vessel ABCD (fig. 8. pl. 87.) open towards the part AB, are solicited by any forces whatever, and remain notwithstanding in equilibrio, these forces must be perpendicular to the surface AB. For the equilibrium would obtain in like manner if a cover or a piston of the same figure as the surface AB were applied to it; and it is manifest that, in this latter case, the forces which act at the surface, or their resultant, must be perpendicular to that surface.

Cor. 3. If, therefore, the forces which act upon the particles of the fluid are those of gravity, we shall see that the direction of gravity is necessarily perpendicular to the surface of a tranquil fluid: consequently, the surface of a heavy fluid must be horizontal to be in equilibrio, whatever may be the figure of the vessel in which it is contained.

Cor. 3. If a vessel, as ABCD (fig. 8.) closed throughout, except at a small orifice O, is full of a fluid without weight; then if any pressure be applied at O, the resulting pressure on the plane surface or bottom CD will neither depend upon the quantity of fluid in the vessel nor on its shape; but, since the pressure applied at O is transmitted equally in all directions, the actual pressure upon CD will be to the pressure at O as the area of CD is to that of the orifice.

Cor. 4. In the same manner will the pressure applied at O be exerted in raising the top AB of the vessel; so that if the top be a plane, of which O forms a part, the vertical pressure tending to force AB upwards will be to the force applied at O as the surface AB to the area O.

Prop. The pressure of a fluid on the horizontal base of a vessel in which it is contained is as the base and perpendicular altitude, whatever be the figure of the vessel that contains it: the upper surface of the fluid being supposed horizontal.

Let any horizontal plane GH (fig. 12, 13, pl. 87.) be supposed drawn, and conceive the fluid contained in the part GCDH of the vessel to be void of weight; then is it evident from cor. 3. of the foregoing proposition, that any vertical filament whatever, EI of the heavy fluid ABHG, exerts at the point I a pressure which is distributed equally through the fluid GCDH; and that this pressure acts equally upwards, to oppose the action of each of the other filaments which stand vertically above GH;

therefore, the filament EI alone keeps in equilibrium all the other filaments of the mass AGHB; consequently, the mass GCDH being still supposed without weight, there will not result any other pressure on the bottom CD than that of a single filament EI, which, being transmitted equally to all the points of CD, will make the pressure upon CD to that upon the base I of the filament EI as the area of CD to the area I. If therefore, we imagine (fig. 11. pl. 87.) a heavy fluid contained in ACB to be divided into horizontal laminæ, the upper lamina will communicate to the bottom CD no other action than would be communicated by the single filament *a b*: and the same thing obtaining with respect to each lamina, the bottom, therefore, is pressed in the same degree as it would be by the combined operation of the filaments *a b*, *b c*, *c d*, &c. Whence, as this pressure is transmitted equally to all the points of CD, it will be equal to the product of CD into the sum of the pressures which the filaments *a b*, *b c*, *c d*, are capable of exercising on the same point, or it will be proportional to CD$\times$ $(ab+bc+cd+$ &c.)

Cor. 1. Hence, if the fluid contained in the vessel ABDC is homogeneous, the pressure on the bottom CD will be expressed by CD+EC; and will be measured by the weight of the prism or cylinder whose base is CD and height EC.

Cor. 2. Hence also, when the heights are equal, the pressures (of the same fluid) are as the bases: when the bases are equal, the pressures are as the heights: when both heights and bases are equal, the pressures on the horizontal bottoms are equal in all, however irregular the shape and different the capacities of the vessels may be.

Cor. 3. In different vessels containing different fluids, the pressures are as the areas of the bottom $\times$ depths $\times$ specific gravities.

Cor. 4. If the laminæ AH, GK, &c. be of different densities, or specific gravities, D, d, δ, &c. then will the pressure on the bottom CD be equal to CD $\times$ (a b . D+b c . d+c d . δ+ &c.).

Scholium. Upon the two principles that fluids press equally in all directions, and in proportion to their perpendicular depths, depends the explanation of the circumstance known by the title of the hydrostatic paradox, which is this: any quantity of water or other fluid, how small soever, may be made to balance and support any quantity or any weight, however great: a circumstance which has been converted to a useful purpose in the construction of some machines (See BRAMAH'S MACHINE). A well-known contrivance to illustrate this principle is the hydrostatic bellows. It consists of two thick boards EF, CD (fig. 10. pl. 87.), about sixteen or eighteen inches diameter, covered or connected firmly with pliable leather round the hedges, to open and shut like common bellows, but without valves; but there is a pipe AB about three feet high fixed into the bellows at B. Now let water be poured into the pipe at A, and it will run into the bellows, gradually separating the boards by raising the upper one. Then, if several weights (three hundred weights, for instance) be laid upon the upper board, the water being poured in at the pipe till it be full, will sustain all the weights, though the water in the pipe should not weigh a quarter of a pound. For the narrower the pipe the better (beyond certain limits), provided we make it long enough, the proportion being always this:

As the area of the orifice or section of the pipe,
To the area of the bellows board, FE:
So is the weight of water in the pipe, AG,
To the weight it will sustain on the board.

For the fluid at B, the bottom of the tube, is pressed with a force varying as its altitude AB: and this pressure is communicated horizontally to all the particles in the space FE, and then distributed equally throughout the fluid in the bellows: consequently, the pressure upwards at FE is equal to the weight of a cylinder of the fluid whose base is FE and altitude AB; while the actual weight of water borne up is only that of the cylinder, whose base is FE and height BG; and hence no weights laid upon CD that do not exceed the weight of a cylinder, of the fluid whose base is EF and altitude AG, will disturb the equilibrium.

Prop. If two immisceable fluids are included in a bent tube, and balance each other, their perpendicular altitudes, estimated from an horizontal plane drawn through the common surface where they are in contact, will be reciprocally as their specific gravities.

Let ABCD (fig. 1. pl. 88.) be such a bent tube, its form and dimensions being arbitrary; and let the common surface of the two immisceable fluids be GH; one fluid occupying the space EFHG, the other the space GHBCKI. Let the specific gravity of the fluid in EFHG be *s*, that of the other S. Through the surface GH draw the horizontal plane GHLOM, then it is manifest that the part GHBCML is naturally in equilibrio: in order, therefore, that the equilibrium may exist in the whole, the pressures exerted upon GH by the fluids contained in EFHG, IKML, must be equal. Now (prop. 2. cor. 3.) the former of these pressures is denoted by GH$\times$FH$\times s$, and the latter by GH$\times$NO$\times$S. Consequently GH$\times$FH$\times s$=GH$\times$NO$\times$S, or FH$\times s$=NO$\times$S; whence flows the proposition, *i. e.* FH : NO : : S : *s*.

Scholium. Before we commence the investigation of the pressure of fluids on oblique and curvilinear surfaces, we may just remark, with respect to pressures upon the horizontal bottoms of vessels, that it is necessary to distinguish between the pressure which the plane CD (fig. 8. pl. 87.) would sustain as arising from the fluid, and that

Fig. 1.

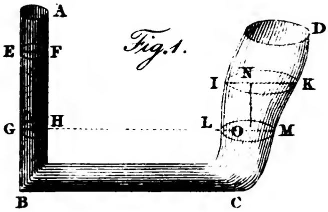


Fig. 2.

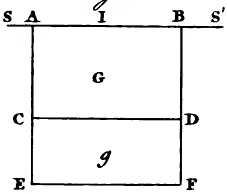


Fig. 3.

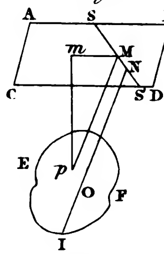


Fig. 4.

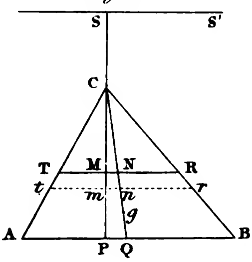


Fig. 5.

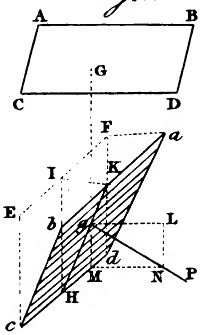


Fig. 6.

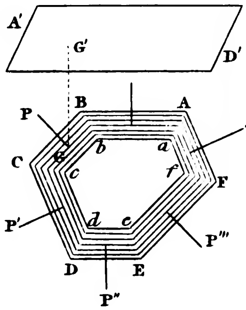


Fig. 7.

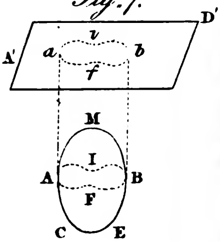


Fig. 8.

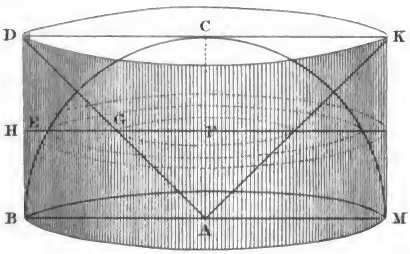
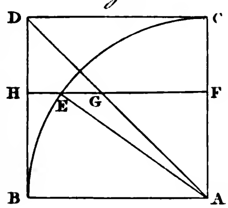


Fig. 9.



The Duke of Bridgewater's under ground Inclined Plane.

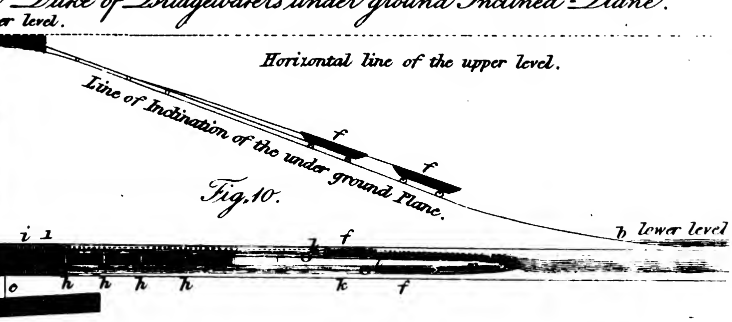
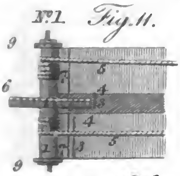


Fig. 10.

No. 1. Fig. 11.



Mutlow Sc. Russ.

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which it would have to sustain if it carried the vessel. If the bottom CD were detached from the vessel, in order to prevent the escape of the water there, the bottom CD must be pressed upwards with a force equal to the weight of the cylinder CDEF of the fluid: but if we would support the vessel, it will require a force equal to the weight both of the vessel and the fluid it contains. Thus, when the vessel is narrowest at bottom it will require more force to support the vessel than to keep its bottom from falling: while, if the vessel is widest at bottom, it may be supported with a less effort than would be necessary to prevent the bottom from separating from the sides of the vessel. But the pressure of the fluid on the bottom of an upright prismatic vessel is equal to its weight.

Prop. Any plane surface immersed in a heavy fluid, of which the upper surface is horizontal, is perpendicularly pressed with a force equal to the weight of a column of that fluid, having the surface pressed for its base, and the depth of its centre of gravity under the surface of the fluid for its altitude.

Let ABCD (fig. 12. 13. pl. 87.) be a vertical section of a vessel terminated by surfaces either plane or curved, and any way inclined to the horizon; and let the vessel be filled with a fluid whose upper surface intersects the section ABCD in the horizontal line AB. If GH $h\,g$ be an indefinitely thin lamina of the fluid, we may consider it abstractly from its weight, and then conceive this lamina as pressed by the superior fluid. Now this pressure is distributed equally through all the particles of the lamina, and acts perpendicularly and equally upon all the points of the faces G g, H h: hence, because this force is the same as would be occasioned by the filament E I alone, the pressure which is exerted perpendicularly upon G g will be expressed by $Gg \times EI$: and the same will manifestly obtain, if, instead of G g as an evanescent right line, we consider it as an evanescent surface. Therefore, in general, the pressure which is exerted perpendicularly upon any evanescent surface, by a heavy homogeneous fluid, is estimated by the continual product of that surface, its distance from the horizontal surface, and the specific gravity of the fluid.

Hence it will follow, that the total pressure exerted upon any plane surface whatever, whether vertical or oblique, is equal to the product of the specific gravity into the sum of the products of the evanescent parts of this surface into their respective distances from the upper surface of the fluid: but by the nature of the centre of gravity, the sum of these latter products is equal to the product of the whole surface into the distance of its centre of gravity from the horizontal surface of the fluid: so that the whole pressur ill be denoted by the continual product of the surface pressed, the distance of its centre of gravity from the upper surface, and the specific gravity of the fluid; which is the proposition in other words.

Cor. 1. The entire lateral pressure of a vessel whose sides are perpendicular to the base is equal to the weight of the fluid contained in a rectangular prism, whose altitude is that of the fluid, and base is a parallelogram, one side of which is equal to the altitude of the fluid, and the other to the semiperimeter of the vessel.

Cor. 2. The pressure against one side of a cubical vessel filled with a fluid is equal to half the pressure against the bottom. And the whole pressure against the sides and bottom is equal to three times the weight of the fluid in the vessel.

Cor. 3. If ABCD, CDEF (fig. 2. pl. 88.) are two rectangles whose common breadth is CD, standing vertically in a fluid, whose upper surface is SS′, then will the pressures upon the rectangles ABCD and CDEF be as AC^2 and AE^2-AC^2.

For if G and g be the respective centres of gravity of the two rectangles, we shall have pressure upon ABCD: pressure upon CDEF :: $ABCD \times IG$: $CDEF \times Ig$ :: $AC \times \frac{1}{2} AC$: $CE \times (AC \times \frac{1}{2} CE)$ :: $AC \times \frac{1}{2} AC$: $(AE - AC) \times \frac{1}{2}(AE \times AC)$ :: AC^2 : $AE^2 - AC^2$.

Cor. 4. Hence, if AE be to AC as $\sqrt{2}$ to 1; the pressures upon ABCD and CDEF will be equal.

Def. The centre of pressure is that point of a surface against which any fluid presses, through which the resultant of all the individual pressures passes, or to which, if a force equal to the whole pressure were applied in a contrary direction, it would keep the surface at rest.

Prop. If a plane surface which is pressed by a fluid be produced to the horizontal surface of it, and their common intersection be made the axis of suspension, the centre of percussion will be the centre of pressure.

Let ABCD (fig. 3. pl. 88.) be the horizontal surface of the fluid which presses upon the plane EIF: produce this plane till it meets the surface of the fluid in the line MN; and let O be the centre of pressure. From any point p of the surface pressed draw the vertical $p\,m$, meeting the horizontal surface in m; and in the plane CB draw from m the line mM perpendicular to MN. The pressure upon p is as $p \cdot pm$, and its effect to turn the plane about MN is as $p \cdot pm \cdot p$M, by the nature of the lever: also, its effect to turn the plane about NI is as $p \cdot pm \cdot$ MN. In like manner, if the plane EIF be supposed to revolve about the axis MN, and to strike an obstacle at O, the percussive force of the particle p, by which it endeavours to move the plane about MN, will be as $p \cdot p\,m$, or as $p \cdot p\,m \cdot p$M; and its force to turn the plane about NI will be as $p \cdot p$M $\cdot$ MN, or as $p \cdot pm \cdot$ MN. And the like correspondence between the percussive and

the pressive forces, of any other particles in the plane EF, may be shewn in the same manner. Consequently, the percussive forces of the whole of the particles, whereby they endeavour to move the plane in the two directions, have the same relation as the forces of pressure, and therefore the centres of pressure and percussion are coincident.

Cor. 1. Hence, the theorems given for the centre of percussion may be applied to the determination of the centre of pressure.

Cor. 2. Hence also appears the mistake of those who assert that the centres of percussion and of pressure do not coincide. They are the centres of oscillation and of pressure which do not coincide universally.

Scholium. To adopt the general formulæ for the centre of percussion to the instance of the centre of pressure, it will be proper to make a slight change in the notation. Let d be the distance from MN of any particle, or of any horizontal lamina of the fluid in contact with the plane EIF; let l be the length of such lamina, and $\dot{d}$ its depth (being considered as evanescent), then will $l\dot{d}$ be its area; also, let δ be the distance of the centre of gravity of the plane EIF from the line MN, where that plane intersects the surface; and let the horizontal distance of $l\dot{d}$ from the line NI be denoted by h: then, with respect to the line MN the proper formula will become $\dfrac{\int l d^2 \dot{d}}{\int l d \dot{d}}$ or $\dfrac{\int l d^2 \dot{d}}{\text{EIF} \times \delta}$; and with respect to the line NI, the formula will become $\dfrac{\int l \text{H} d \dot{d}}{\int l d \dot{d}}$ or $\dfrac{\int l \text{H} d \dot{d}}{\text{EIF} \times \delta}$. See CENTER of PERCUSSION.

A few examples are here added to illustrate the use of these theorems.

I. Let a reservoir which contains water, or any other fluid (its specific gravity being s), have one of its sides plane and vertical: if we imagine a right line drawn vertically upon this plane, its length being λ, and the distance of its centre of gravity from the surface of the fluid δ, the pressure exerted upon this line will be $s\,\delta\lambda$. Let the distance of the superior extremity of the line λ from the surface of the fluid be a, and make $a+\lambda=e$, so shall e be the distance of the lower extremity of the line λ from the horizontal surface of the fluid. Then, to find the centre of pressure of the line λ, we take the complete fluent of the expression $\dfrac{\int l d^2 \dot{d}}{\int l d \dot{d}}$ (l being constant) which is $\dfrac{2(d^3-a^3)}{3(d^2-a^2)}$, or, when the variable d becomes equal to e we have $\dfrac{2(e^3-a^3)}{3(e^2-a^2)}$, for the distance of the centre of pressure from the horizontal surface of the fluid. When one of the extremities of the line λ coincides with this surface we have $a=0$, and $e=\lambda$, and the distance of the centre of pressure becomes $\frac{2}{3}\lambda$.

II. If upon the vertical line λ we construct a rectangle, of which the horizontal base is h, the whole pressure upon it will be $s\,h\,\delta\,\lambda$, and the distance of the centre of pressure from the surface of the fluid will be $\dfrac{2(e^3-a^3)}{3(e^2-a^2)}$ the same as we have just found. And this centre must evidently be found upon the vertical line which divides the parallelogram into two equal parts.

If the upper horizontal side of the parallelogram coincides with the surface of the fluid (as the side AB of the parallelogram ABCD, fig. 2. pl. 88. its tendency to turn about its base will be $\frac{1}{2} s\,h\,\lambda^2 \times \frac{1}{3}\lambda = \frac{1}{6} s\,h\,\lambda^3$, and its tendency to turn about one of its vertical sides will be $\frac{1}{2} s\,h\,\lambda^2 \times \frac{1}{2} h = \frac{1}{4} s\,h^2\lambda^2$: thus the first of these efforts will be to the second as $\frac{1}{6} s\,h\,\lambda^3 : \frac{1}{4} s\,h^2\lambda^2$, or as $2\lambda : 3h$; which reduces to 2: 3, when the rectangle becomes a square.

III. To determine the centre of pressure in the triangle CAB (fig. 4.) whose side AB is horizontal, and which is placed vertically in a fluid whose horizontal surface is SS′. Through C, the summit of the triangle, draw the vertical line SCP, also the line CQ bisecting the base AB, and any line TR parallel to AB. Make $\text{CP}=\lambda$, $\text{AB}=h$, $\text{CS}=a$, $\text{SP}=a+\lambda=e$, the distance of the horizontal line in which lies the centre of gravity of the triangle from $\text{S}=\delta$ (that is, if $\text{C}g=\frac{2}{3}\text{CQ}$, the distance between SS′ and $g=\delta$), the angle $\text{PCQ}=k$, $\text{SM}=d$, $\text{TR}=l$, $\text{CM}=c=d-a$.

The whole pressure upon this triangle will be represented by $s \times \frac{1}{2} h\,\lambda \times \delta = \frac{1}{2} s\,\delta\,\lambda\,h$. And to find the depth of the centre of pressure below SS′ we must find the fluent of the expression $\dfrac{\int l d^2 \dot{d}}{\text{ABC} \times \delta}$, or $\dfrac{\int l d^2 \dot{d}}{\frac{1}{2}\delta\lambda h}$. In order to this we have CP: AB :: CM: TR, or $\lambda : h :: c : l = \dfrac{c\,h}{\lambda} = \dfrac{h}{\lambda}(d-a)$, which substituted for l in $\int l d^2 \dot{d}$, gives $\dfrac{h}{\lambda}\int (d^3 - a\,d^2)\,\dot{d} = \dfrac{h}{\lambda}\left(\frac{1}{4}d^4 - \frac{1}{3} a\,d^3\right) + \text{C}$. The constant quantity C may be determined by considering that the fluent must vanish at the point C, that is, when $l=0$, or when $d-a=0$,

that is, when $d=a$. Hence, making the substitution, we have $\frac{h}{\lambda}(\frac{1}{4}a^4-\frac{1}{3}a)\times C=0$, whence $C=\frac{h}{12\lambda}a^4$ and the correct fluent is $\frac{h}{\lambda}\frac{1}{4}d^4-\frac{1}{3}a\,d^3+\frac{1}{12}a^4)$. Hence then, for the whole triangle, in which SM=SP, or $d=e$, we substitute e for d in the fluent, and divide by the denominator $\frac{1}{2}\delta\lambda h$ of the general expression, which gives for the depth of the centre of pressure of the whole triangle the value $\frac{\frac{1}{4}e^4-\frac{1}{3}a\,e^3+\frac{1}{12}a^4}{\frac{1}{2}\delta\lambda^2}$, which is evidently independent of the base h of the triangle.

When the vertex of the triangle is at the horizontal surface of the fluid $e=\lambda$, $a=0$, $\delta=\frac{2}{3}\lambda$, and the expression becomes $\frac{3}{4}\lambda$.

IV. To determine the distance of the centre of pressure from the vertical line CP. Here we must take the formulæ $\frac{\int l\,H\,d\,\dot{d}}{\int l\,d\,\dot{d}}$, in which H represents MN=c tang. $k=(d-a)$ tang. k. Substituting this value of H, and $\frac{h}{\lambda}(d-a)$ for l, its value found above, we have $\int l\,H\,d\,\dot{d}=\frac{h\,\text{tang.}\,k}{\lambda}$ $\int(d^3-2a\,d^2+a^2d)\,\dot{d}=\frac{h\,\text{tang.}\,k}{\lambda}(\frac{1}{4}d^4-\frac{2}{3}a\,d^3$ $+\frac{1}{2}a^2d^2)+C$. In this case, also, the fluent vanishes when $d=a$; whence we have $\frac{h.\,\text{tang.}\,k.}{12\lambda}a^4+C=0$, and $C=-\frac{h.\,\text{tang.}\,k}{12\lambda}a^4$; so that the correct fluent is $\frac{h.\,\text{tang.}\,k}{\lambda}(\frac{1}{4}d^4-$ $\frac{2}{3}a\,d^3+\frac{1}{2}a^2d^2-\frac{1}{12}a^4)$. Hence, making $d=e$, and dividing by $\int l\,d\,\dot{d}=\frac{1}{2}\delta\lambda h$, we have for the distance sought, tang. k $\times$ $\frac{\frac{1}{4}e^4-\frac{2}{3}a\,e^3+\frac{1}{2}a^2\,e^2e-\frac{1}{12}a^4}{\frac{1}{2}\delta\lambda^2}$.

1. When the triangle is isosceles the angle $k=0$, and the preceding value vanishes, as it obviously ought to do; for in that case the triangle is symmetrical with respect to CP, and the pressures are in equilibrio about that line.

2. When the triangle is right-angled, and has its base or horizontal side AB=h one of the sides about the right-angle, that is, when CA coincides with CP, then is $h=2\lambda$. tang. k, or tang. $k=\frac{h}{2\lambda}$, which transforms the expression for the centre of pressure's distance from SP to $\frac{h}{\delta\lambda^3}(\frac{1}{4}\dot{e}^4-\frac{2}{3}a\,e^3+\frac{1}{2}a^2\,\dot{e}^2-\frac{1}{12}a^4)$.

3. Finally, when the vertex of the triangle is at the surface of SS′ of the fluid, $a=0$, $\dot{e}=\lambda$, $\delta=\frac{2}{3}\lambda$, and the expression becomes $\frac{3}{4}\lambda$. tang. k; which, for the right-angled triangle, reduces to $\frac{3}{8}h$.

4. When the triangle has its vertex at the horizontal surface of the fluid, the tendency to turn about the base is to that to turn about the perpendicular let fall from the vertex upon the base as 1 to 3 tang. k; and, in the case of the right-angled triangle, as 2λ to $3h$: which, when the legs of the triangle are equal, reduces to the ratio of 2 to 3. As in the case of the rectangle and square.

If C and AB lie in different sides of SS′, that is, if part of the triangle is out of the fluid, no other change will be necessary in the preceding expressions than a change of signs in those terms which contain uneven powers of a. So that this simple transformation will accommodate the preceding general theorems to the case of trapezoids.

5. If the radius of a circle be r, and δ the distance of its centre below the surface of the fluid in the plane of the circle, then is the distance of the centre of pressure from the upper surface, in the same plane, expressed by $\delta+\frac{r^2}{4\varrho}$; which when the upper part of the circle just touches the surface becomes $\frac{5}{4}r$. The investigation of this is left for the student's exercise.

It is hardly necessary to remark, that the results of the operations in this scholium may be safely applied in the analogous inquiries relative to the centre of percussion.

Prop. To inquire generally into the results of all the pressures, upon any surface plane or curved, regular or irregular, both in the vertical and the horizontal direction.

This is usually performed by foreign authors, by means of the calculus of partial differences. But another mode of investigation is pursued here, as we think it likely to carry more conviction to the mind of a learner. Had the vertical pressure alone been the object of investigation, it might be determined far more concisely.

I. Whatever the figure of a body may be, we may always imagine it to consist of an assemblage of an infinite number of indefinitely small laminæ respectively parallel, and the surface of each lamina as an assemblage of many trapezoids, their number indeed being infinite likewise, when the surface in contact with the fluid is curved. Hence, to estimate the result of the pressures of a fluid, whether upon the interior

surface of a vessel which contains it, or upon the exterior surface of a body immersed in it, we must first estimate the result of the pressure upon the surface of a trapezoid whose height is evanescent.

Conceive, therefore, *a b c d* (fig. 5. pl. 88.) a trapezoid whose two parallel sides are *a b*, *c d*, and whose height HK is infinitely small with regard to those sides. To resist the pressure upon this surface we must apply to the centre of gravity *g* of the trapezoid a force P perpendicularly to its plane, the value of which is expressed by the product of the surface of the trapezoid into the distance G *g* of its centre of gravity from the horizontal surface ABCD of the fluid.

To determine the effect of this force P both in the vertical and the horizontal direction, conceive a vertical plane *c d* FE to pass through the line *c d*, and a horizontal plane *a b* EF through the line *a b*; the common intersection of these planes being EF: then, having drawn the vertical lines *c* E, *d* F, meeting the horizontal plane in E and F, join *b* E and *a* F: again, through the direction P *g* of the force P, conceive a plane KIH perpendicular to *c d*, and of which H *g* K and HI are the intersections with the two planes *a b c d* and FE *c d*: this plane will be perpendicular to the planes *a b c d* and FE *c d*, because *c d* is their common intersection: finally, from the point K, where *a b* and H *g* meet, draw KI perpendicular to the plane FE *c d*, this line must necessarily be perpendicular to HI.

The construction effected, resolve the force P (represented by *g* N) into two others which are also in the plane KIH, of which the horizontal one is *g* L, and the vertical one *g* M. Calling these component forces L and M, we have, by the nature of the parallelogram of forces P : L : M : : *g* N : *g* L : *g* M : : *g* N : *g* L : LN : : HK : HI : IK, the triangles *g* L N, HIK, being evidently similar. Multiplying the three latter terms by $\frac{ab+cd}{2} \times$ G *g*, which will not change the ratio, we shall have P : L : M : : HK $\times \frac{ab+cd}{2} \times$ G *g* : HI $\times \frac{ab+cd}{2} \times$ G *g* : IK $\times \frac{ab+cd}{2} \times$ G *g*. Now it may be observed, 1st. That HK $\times \frac{ab+cd}{2}$ is the surface of the trapezoid *a b c d*. 2dly. That since *c* E and *d* F are parallel, as likewise *c d* and EF, we have *c d* = FE, therefore IK $+ \frac{ab+cd}{2} =$ IK $+ \frac{ab+EF}{2}$, which, of consequence, is the surface of the trapezoid *a b* EF. 3dly. That, because the height of the trapezoid *a b c d* is evanescent with respect to the sides *a b* and *c d* EF, which is equal to *c d*, may be taken both for *c d* and for *a b*; so that HI $\times \frac{ab+cd}{2}$ reduces to HI $\times$ EF, which is the surface of the rectangle E *c d* F. We have, therefore, P : L : M : : *a b c d* $\times$ G *g* : E *c d* F $\times$ G *g* : *a* FE *b* $\times$ G *g*. But we have supposed that the force P is expressed by *a b c d* $\times$ G *g*; consequently, the horizontal force L is denoted by E *c d* F $\times$ G *g*, and the vertical force M by *a* FE *b* $\times$ G *g*.

As the triangle may be considered as a trapezoid, of which one of the parallel sides vanishes, the same thing, therefore, obtains for any evanescent triangle.

Conceiving, now, that from the angles *a*, *d*, *c*, *b*, lines are drawn to fall perpendicularly upon the plane ABCD, these perpendiculars will be the edges of a prismatic frustrum, of which the horizontal base is equal to *a* FE *b*, and the inclined base *a b c d*; or, as *a b* and *c d* are supposed indefinitely near, the solidity of the prismatic frustrum will not differ sensibly from that of the prism which has the same horizontal base, and whose height is G *g*: but this latter is equal to *a* FE *b* $\times$ G *g*, which is precisely the expression above found for the vertical force M. Hence it appears, that this force is aqual to the weight of a prismatic frustrum of the fluid whose inclined base is a b c d, and horizontal base the projection of a b c d upon the horizontal surface ABCD.

II. Let us next consider any solid whatever cut into an indefinite number of horizontal laminæ, such as ABDE *a b d e* (fig. 6. pl. 88.), and that perpendicularly to the centre of gravity of the surface of each trapezoid into which the contour of the laminæ is divided, forces are applied, each represented by the product of the surface of the corresponding trapezoid into the distance of its centre of gravity from the horizontal surface A′D′. These forces are the pressures of a heavy fluid, sustained by the interior surface of the laminæ ABDE *a b d e* of a vessel which contains it; they are also the pressures of such a fluid which would be sustained by the exterior surface of a solid whose contour is the same, and which is immersed to the same depth. But it is manifest that if each of those forces P, P′ P″, &c. were decomposed into two others, the one vertical, the other horizontal, each vertical force would be represented by the weight of a prismatic frustrum of the fluid whose inclined base is one of the trapezoids in the contour of the lamina, and its horizontal base the projection of that trapezoid upon the upper surface of the fluid. Therefore the sum of these vertical forces, or the single vertical resulting force, will be represented by the sum of the weights of all those prismatic frustrums: and the same property may obviously be extended to every other horizontal lamina, we may conclude,

1. That, if a vessel, of any figure, be

full of fluid, and have over every part of the sides and bottom a perpendicular column of the fluid reaching to the surface, the whole vertical pressure of the fluid upon the bottom and sides of that vessel will be equal to the weight of the whole fluid.

II. That, if a body, as AEDBM (fig. 7. pl. 88.) of which AIBF is the greatest horizontal section, is immersed in a fluid to any depth whatever, and if we drop the consideration of the pressure sustained by the upper part AMB, the vertical effort of the fluid to raise the body is equal to the weight of the volume of fluid which is comprised between the surface A′ D′, the surface AIBFE, and the convex surface formed by perpendiculars let fall from all the points of the perimeter AIBF upon the plane A′ D′; that is equal to the sum of the weights of fluid in the prism *aibf* AIBF, and the space AIBFCE.

III. If we would now estimate the pressure sustained by the superior surface AMBFI of the body, we shall see, by the same kind of reasoning, that the result in the vertical direction tending to force the body downwards, is an effort equal to the weight of the volume comprised between the horizontal projection *aibf*, and the upper surface AMBFI of the body. If, then, from the first of these efforts we deduct the second, it will appear that the body is pushed vertically upwards, with an effort equal to the weight of a volume of the fluid equal to that of the body immersed. We conclude therefore that, if a body is immersed in any fluid whatever, it will lose (relatively) as much of its weight as is equal to the weight of the quantity of fluid it displaces.

IV. With regard to the resultant of all the vertical forces whose magnitude we have just determined, it is easy to see that it must pass through the centre of gravity of the volume of fluid displaced. For, if we conceive this volume decomposed into an infinite number of evanescent vertical filaments, the effort made by the fluid to push each filament vertically will be expressed by the weight of a quantity of fluid equal to that filament. Therefore, to obtain the distance of the resultant from any vertical plane whatever, we must multiply the mass of each filament (considered as of the same nature with the fluid) by its distance from this plane, and divide the sum of the products by the sum of the filaments; which is precisely the rule that must be followed to find the centre of gravity of the volume displaced. Therefore, universally, a body immersed either wholly or in part in a heavy fluid, and at rest, receives from the fluid pressures which are together equivalent to a vertical force directed upwards through the centre of gravity of the fluid displaced by the body, and equal to the weight of a quantity of the fluid so displaced by the immersed part of the body.

Indeed we may readily assign a reason, *à priori*, of this; for, supposing a force acting on a body without heaviness retains it in equilibrio when immersed either wholly or partly in a heavy fluid; if we substitute for the immersed part of the body, that is, for the fluid it displaces, an equal and similar portion of the same fluid become solid (as ice, and the density unchanged), the equilibrium will still obviously subsist; consequently, the pressure of the fluid upon the immersed body will be altogether equal and directly opposed to the weight of this solid; and must, therefore, pass through its centre of gravity in order to sustain it in equilibrium.

V. It now remains for us to consider how the horizontal forces are disposed of.—If we take any one of the horizontal laminæ into which either the fluid, or the solid immersed in the fluid, may be imagined to be divided, and through the sides *ab*, *bc*, *cd*, &c. (fig. 6. pl. 88.) of the inferior section conceive vertical planes to pass, and to be terminated by the superior section; these planes will form the contour of a prism whose height is that of the lamina, and each face of the prism will have (I) the measure of its surface proportional to the value of the horizontal force to which it is perpendicular. But, as all these faces are of the same altitude, their surfaces are proportional to their bases *ab*, *bc*, &c. and consequently the horizontal forces are respectively in the ratio of the sides *ab*, *bc*, &c. And as the altitudes of these faces are evanescent, we may regard all these forces as applied in the same horizontal plane *abcdef*, and to be each respectively proportional to the length of the side, on the middle of which it acts perpendicularly. Now it has been shewn, that if any number of forces represented in magnitude and direction by the sides of a polygon taken in order, act simultaneously upon the same point, they will be mutually destroyed, and the point continue at rest: also, that when any number of forces are in equilibrio when applied to different points of a body, they are the same as would be in equilibrio about a single point; and, since the directions of the several forces P, P′, P″, &c. in the present case would, if produced, form a polygon similar to *abcdef*, the consequences just referred to will apply to them likewise: and, in like manner, to the pressures upon any other horizontal laminæ. Consequently, the efforts which result in the horizontal direction, from the pressure of a heavy fluid upon the surface of any body immersed in it, are mutually destroyed.

Scholium. From the preceding doctrine of the pressure of fluids, an important practical maxim may be deduced. We have seen that in any vessel containing a heavy fluid, the parts that are deepest below the surface sustain a proportionally greater pressure. If, therefore, we have to construct an assemblage of vertical pipes or

tubes, to elevate water or any other fluid, we may run into a superfluous expense, by giving the same thickness to the material in every part. For, if the substance be uniformly thick, and the lower parts are sufficiently strong, the upper parts are, of consequence, much thicker than necessary. The method suggested by theory is, while we give to the whole assemblage the same interior diameter, to give a safe and sufficient thickness to the material at the lowest part, and let it gradually diminish to the top, in the same ratio nearly as the diminution in the depth of the fluid. The same maxim may also find an application in the construction of sluice-gates, dams, banks, &c. And in all such cases it is advisable to determine, first, the adequate strength to resist the pressure at the greatest depth; as, by this means, safety may always be ensured without any waste of materials.

A few more general observations will conclude this article.

There exist two states of equilibrium perfectly distinct. In one, if the equilibrium be ever so little deranged, the bodies which compose the system only oscillate about their primitive position; and then the equilibrium is *stable*. This stability is *absolute*, if it obtains whatever be the oscillations of the system; it is *relative*, if it obtain only with respect to oscillations of a certain kind. In the other state of equilibrium, bodies deviate more and more from their primitive position when once they have removed from it. We may derive a correct idea of these two states, by contemplating an ellipse placed vertically on a horizontal plane. When the ellipse is equilibrated upon its minor axis, it is obvious, that if it be drawn a little from that situation, it will tend to return to it, making oscillations which friction and the resistance of the air will soon annihilate: but if the ellipse be in equilibrium upon its major axis, when once drawn from that situation, it will tend to deviate still farther, and terminate by adjusting itself upon its minor axis. The stability of equilibrium depends, therefore, on the nature of the minute oscillations which the system, any way disturbed, will make about that state. Frequently, this kind of inquiry presents many difficulties; but in several cases, and especially in that of floating bodies, to judge of the stability of the equilibrium, it will suffice to know, whether the force which solicits the system a little deranged from that state, tends to bring it back thither again. We shall attain this with regard to bodies floating on water, by the following rule.

If, through the centre of gravity of the plane of floatation (or section level with the water), of a floating body, we imagine a horizontal axis drawn so that the sum of the products of each element of the section, into the square of its distance from that axis, shall be less than relatively to any other horizontal axis drawn through the same centre; the equilibrium is stable in every direction when that sum exceeds the product of the volume of fluid displaced into the height of the centre of gravity of the body, above the centre of gravity of that volume. This rule is especially useful in the construction of vessels, to which it is proper to give a stability sufficient to furnish resistance to the efforts of tempestuous winds and swells. In a vessel, the axis drawn from the poop to the prow, is that with respect to which the sum in question is a *minimum;* it is therefore easy to know, and even to measure the stability, by the preceding rule.

Two fluids contained in a vessel, dispose themselves in such manner that the heaviest occupies the bottom of the vessel, and that the surface which separates them is horizontal.

If two fluids communicate by means of a curved tube, the surface which separates them in the state of equilibrium is horizontal, and their heights above that surface are reciprocally as their respective densities. Supposing, therefore, the density of the whole atmosphere to be the same as it is near the earth at the temperature of freezing water, the height of such atmosphere would be about $5\frac{1}{4}$ miles: but since the densities of the atmospheric strata diminish as they are elevated farther above the earth's surface, the height of the real atmosphere is considerably greater.

To sketch the general laws of the equilibrium of a fluid mass solicited by any forces whatever, we shall observe that each point of the interior of that mass experiences a pressure which, in the atmosphere, would be measured by the barometer, and which may be ascertained in a similar manner for any other fluid. Considering each molecule as an indefinitely small rectangular parallelopiped, the pressure of the surrounding fluid will be perpendicular to the faces of that parallelopiped which tends to move itself perpendicularly to each face, in virtue of the difference of the pressures which the fluid exerts upon the two opposite faces. From these differences of pressures result three forces respectively perpendicular, which must be combined with the other forces that solicit the fluid molecule. Thus, that molecule will come to be in equilibrium in virtue of all the forces; the principle of *virtual velocities* will give the general equations of its equilibrium, whatever be its position in the entire mass. The conditions of integrability of these differential equations will make known the relations which ought to subsist between the forces by which the fluid is actuated, to render the equilibrium possible: their integration will give the pressure that each fluid molecule experiences; and, if the fluid be compressible, that pressure will determine its elastici-

ty and its density. See farther, the articles CAPILLARY ATTRACTION, FLOATING BODIES, SPECIFIC GRAVITY, &c.

HYDROSULPHU'RETS, which Mr. Chenevix calls *Sulphuretted Hydrogurets*, are combinations of sulphuretted hydrogen with earths, alkalies, and metals. The earthy and alkaline hydrocarbonats may be formed by dissolving or mixing the bases respectively with water, and causing the sulphuretted hydrogen gas to pass through them till they refuse to absorb any more. It is proper to cause the gas to pass through a small vessel of water before it reaches the base with which it is to combine, in order to separate any impurities with which it might be mixed. These bodies, as well as the hydroguretted sulphurets, have the property of precipitating all metallic bodies from any solution in which they may be contained, and are therefore very valuable tests of the presence of metals: they are all soluble in water, and the solution is colourless; but on exposure to the air, it becomes greenish, or yellowish, and deposits sulphur on the sides of the vessel; a longer exposure, however, renders it again colourless, but being decomposed, it then contains only the sulphat of the base of the original compound.

The metallic hydrosulphurets are formed by combining the oxyds of the metals with sulphuretted hydrogen.

Among these bodies, the hydrosulphuret (or the hydroguretted sulphuret) of potash or of ammonia, is that which is generally made choice of for metallic precipitations, which may be distinguished from each other by their colour. The following table, given by Dr. Thomson, will shew the colour of these precipitates respectively.

Metals	Precipitate by	
	Hydrosulphuret of Potash.	Hydroguretted Sulphuret of Potash.
Gold,	Yellow,	Yellow,
Silver,	Black,	Black,
Mercury,	Brown-black,	Brown, becoming black,
Copper,	Black,	Brown,
Iron,	Black,	Black, becoming yellow,
Tin,	Black,	Black,
Lead,	Black,	White, becoming black,
Nickel,	Black,	Black,
Zinc,	White,	White,
Bismuth,	Black,	Black,
Antimony,	Orange,	Orange-yellow,
Tellurium,	Black,	Deep brown, or black,
Arsenic,	Yellow,	Yellow,
Cobalt,	Black,	Black,
Manganese,	White,	White,
Uranium,	Brown,	Brownish-yellow,
Titanium,	Glass-green,	Bluish-green,
Chromium,	Green.	

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These precipitates have not been much examined by chymists; an investigation of them would probably lead to many valuable results. See SULPHURET.

The principal hydrosulphurets, earthy, alkaline, and metallic, we shall notice alphabetically.

Hydrosulphuret of Ammonia is easily procured by passing a current of sulphuretted hydrogen through liquid ammonia; and very readily assumes a greenish yellow colour. It may also be obtained by distilling equal parts of lime, sal ammoniac, and sulphur; the yellow liquid, being allowed some time to fume, deposits its excess of sulphur, and becomes at length very nearly pure.

Hydrosulphuret of Antimony is formed by dropping hydrosulphuret of potash or ammonia into an acid solution of antimony; the beautiful orange-coloured precipitate which falls is hydrosulphuret of antimony. This compound has long been known, though its composition has been but lately discovered, under the title of *Kermes mineral;* in this form, however, it is probably not in a state of absolute purity, having, it appears, a small excess of sulphur.

Hydrosulphuret of Barytes may be obtained in the form of crystals, by evaporating a mixture of sulphat of barytes and charcoal, after the mixture has been heated red-hot in a crucible, dissolved in boiling water, and filtered. These crystals, when separated and dried, are in the form of scales, white, and of a silky lustre. Their solution in water is very readily decomposed by exposure to the air.

Hydrosulphuret of Iron is soluble in water, but a black powder soon precipitates, which is hydroguretted sulphuret of iron.

Hydrosulphuret of Manganese may be formed by mixing hydrosulphuret of potash with a salt of manganese; or by treating the black oxyd of that metal with sulphuretted hydrogen water, and evaporating.

Hydrosulphuret of Potash is formed not only by saturating that alkali with sulphuretted hydrogen, but by evaporating the solution of sulphuret of potash. It is transparent and colourless, and its crystals are very much like those of sulphat of soda, (Glauber's salts). Its taste is alkaline, and extremely bitter; it deliquesces into a syrupy liquid, tinging green the bodies which it touches. It has no smell while in the state of crystals, but in that of deliquescence, its smell is fetid. When thrown into sulphat of alumine, crystals of alum are soon deposited. It dissolves in water and alcohol, and thereby considerably diminishes the temperature of the liquid.

Hydrosulphuret of Soda is prepared in the same manner as the preceding. It is better known than any of the others. Its aqueous solution was first examined with success by Berthollet; but it was first obtained in a

crystallised form by Vauquelin. The crystals are transparent and colourless, having the figure of four-sided prisms terminated by quadrangular pyramids, and sometimes of octahedrons. The taste of this hydrosulphuret is extremely bitter: it is very soluble in water and alcohol, producing cold; it deliquesces on exposure to the air, and is decomposed by acids.

Hydrosulphuret of Zinc may be formed by treating the white oxyd of that metal with hydrosulphuret of ammonia; or by the precipitation of zinc from its solution in an acid, by means of the hydrosulphuret of potash or ammonia.

The other hydrosulphurets either have not been much examined, or have been found to differ very little from the common properties of the preceding.

In the composition of the articles which relate to hydrogen and its combinations, recourse has been had to the writings of Thomson, Davy, Lavoisier, Fourcroy, Kirwan, Accum, Parkes, the Journals of Nicholson and Tilloch, &c.

HYDROSULPHURETUM STIBII RUBRUM. Kermes mineralis. This sulphuret of antimony was formerly in high estimation as an expectorant, sudorific, and antispasmodic, in difficult respiration, rheumatism, diseases of the skin and glands.

HYDROTHO'RAX, (*hydrothorax*, *acis*, m. υδροθωραξ, from υδωρ, water, and θωραξ, the chest.) Hydrops thoracis. Hydrops pectoris. A genus of disease in the class cachexiæ, and order intumescentiæ of Cullen, known by dyspnœa, paleness of face, œdematous swelling of the legs, scarcity of urine, impatience of an horizontal situation, a sense of weight and tightness across the chest, sudden startings from sleep, and palpitations of the heart.

HYDRO'TIC, a purger of water or phlegm.

HYDRU'NTUM, in ancient geography, a noble and commodious port of Calabria, from which there was a shorter passage to Apollonia (*Pliny*). Famous for its antiquity, and for the fidelity and bravery of its inhabitants. Now Otranto, a city of Naples.

HYDRUS, in astronomy, the male hydra, a small southern constellation, containing 10 stars, viz. 0. 0. 1. 1. 4. 4.

HYE'MANTES, in the primitive church, offenders who had been guilty of such enormities, that they were not allowed to enter the porch of the churches with the other penitents, but were obliged to stand without, exposed to all the inclemency of the weather.

HY'ENA. See HYÆNA.

HYGEI'A, υγεια, from υγιης, sound.) Sound health of body and mind.

HYGEIA, the goddess of health, daughter of Æsculapius, held in great veneration among the ancients. According to some authors, Hygeia is the same as Minerva.

HYGIE'NE (*Hygiene*, *es*, f. υγιεινη, from υγιαινω, to be well). Modern physicians have applied this term to that division of *therapia* which treats of the diet of the sick and the non-naturals.

HYGRO'LOGY (*Hygrologia*, *æ*, f. υγρολογια, from υγρο, a humour or fluid, and λογος, a discourse). The doctrine of the fluids.

HYGRO'MA (*Hygroma*, *atis*, n. υγρωμα, from υγρος, a liquid). An encysted tumour, whose contents are either serum or a fluid like lymph. It sometimes happens that these tumours are filled with hydatids. Hygromatous tumours require the removal of the cyst, or the destruction of its secreting surface.

HYGROMETER (from ὑγρος, a liquid, and μετρεω), an instrument used to measure the degrees of dryness or moisture of the atmosphere, in like manner as the barometer and thermometer measure the different degrees of its heaviness and its warmth.

There are various kinds of hygrometers; for whatever body either swells or shrinks, by dryness or moisture, is capable of being formed into an hygrometer. Such are woods of most kinds, particularly ash, deal, poplar, &c. Such also is catgut, the beard of a wild oat, &c.

All bodies that are susceptible of imbibing water, have a greater or less disposition to unite themselves with that fluid, by the effect of an attraction similar to chymical affinity. If we plunge into water several of these bodies, such as wood, a sponge, paper, &c. they will appropriate to themselves a quantity of that liquid, which will vary with the bodies respectively; and, as in proportion as they tend towards the point of saturation, their affinity for the water continues to diminish, when those which have most powerfully attracted the water, have arrived at the point, where their attractive force is found solely equal to that of the body, which acted most feebly upon the same liquid, there will be established a species of equilibrium between all those bodies, in such manner, that at this term the imbibing will be stopped. If there be brought into contact two wetted or soaked bodies, whose affinities for water are not in equilibrio, that whose affinity is the weakest, will yield of its fluid to the other, until the equilibrium is established; and it is in this disposition of a body to moisten another body that touches it, that what is called humidity properly consists. Of all bodies, the air is that of which we are most interested to know the different degrees of humidity, and it is also towards the means of procuring this knowledge, that philosophers have principally directed their researches; hence the various kinds of instruments that have been contrived to measure the humidity of the air. A multitude of bodies are known n which the humidity, in propor-

tion as it augments or diminishes, occasions divers degrees of dilatation or of contraction, according as the body is inclined to one or other of these effects, by reason of its organization, of its texture, or of the disposition of the fibres of which it is the assemblage. For example, water, by introducing itself within cords, makes the fibres twist and become situated obliquely, produces between those fibres such a separation, as causes the cord to thicken or swell, and, by a necessary consequence, to shorten. The twisted threads, of which cloths are fabricated, may be considered as small cords, which experience, in like manner, a contraction by the action of humidity; whence it happens that cloths, especially when wetted for the first time, contract in the two directions of their intersecting threads; paper, on the contrary, which is only an assemblage of filaments very thin, very short, and disposed irregularly in all directions, lengthens in all the dimensions of its surface, in proportion as the water, by insinuating itself between the intervals of those same filaments, acts by placing them further asunder, proceeding from the middle towards the edges. Different bodies have been employed successively in the construction of hygrometers, chosen from among those in which humidity produces the most sensible motions. Philosophers have sought also to measure the humidity of the air by the augmentation of weight undergone by certain substances, such as a tuft of wool, or portions of salt, by absorbing the water contained in the air. But, besides that these methods were in themselves very imperfect, the bodies employed were subject to alterations which would make them lose their hygrometric quality more or less promptly; they had, therefore, the double inconvenience of being inaccurate, and not being of long service. To deduce from hygrometry real advantages, it must be put in a state of rivalry with the thermometer, by presenting a series of exact observations, such as may be comparable in the different hygrometers. The celebrated Saussure, to whom we are indebted for a very estimable work on hygrometry, has attained the accomplishment of this object by a process of which we shall attempt to give some idea: The principal piece in this hygrometer is a hair, which Saussure first causes to undergo a preparation, the design of which is to divest it of a kind of oiliness that is natural to it, and that secures it to a certain point, from the action of humidity. This preparation is made at the same time upon a certain number of hairs forming a tuft, the thickness of which need not exceed that of a writing pen, and contained in a fine cloth serving them for a case. The hairs thus enveloped are immersed in a long-necked phial full of water, which holds in solution nearly a hundreth part of its weight of sulphate of soda, making this water boil nearly thirty minutes; the hairs are then passed through two vessels of pure water, while they are boiling; afterwards they are drawn from their wrapper, and separated; then they are suspended to dry in the air; after which there only remains to make choice of those which are the cleanest, softest, most brilliant, and most transparent. It is known that humidity lengthens the hair, and that the process of drying shortens it. To render both these effects more perceptible, Saussure attached one of the two ends of the hair to a fixed point, and the other to the circumference of a moveable cylinder, that carries at one of its extremities a light index or hand. The hair is bound by a counter-weight of about three grains, suspended by a delicate silk, which is rolled in a contrary way about the same cylinder. In proportion as the hair lengthens or shortens, it causes the cylinder to turn in one or the other direction, and by a necessary consequence, the little index turns likewise, the motions of which are measured on the circumference of a graduated circle, about which the index performs its revolution, as in common clocks. In this manner a very small variation in the length of the hair becomes perceptible, by the much more considerable motion that it occasions in the extremity of the index; and it will be easily conceived, that equal degrees of expansion, or of contraction in the hair, answers to equal arcs described by the extremity of the index. To give to the scale such a basis as may establish a relation between all the hygrometers that are constructed upon the same principles, Saussure assumes two fixed terms, one of which is the extreme of humidity, and the other that of dryness: he determines the first by placing the hygrometer under a glass receiver, the whole interior surface of which he had completely moistened with water; the air being saturated by this water, acts by its humidity upon the hair to lengthen it. He moistened anew the interior of the receiver, as often as it was necessary; and he knew that the term of extreme humidity was attained, when, by a longer continuance under the receiver, the hair ceased to extend itself. To obtain the contrary limit of extreme dryness, the same philosopher made use of a hot and well-dried receiver, under which he included the hygrometer, with a piece of iron plate, likewise heated and covered with a fixed alkali. This salt, by exercising its absorbent faculty upon the remaining humidity in the surrounding air, causes the hair to contract itself, until it has attained the ultimate limit of its contraction. The scale of the instrument is divided into a hundred degrees. The zero indicates the limit of extreme dryness, and the number one hundred that of extreme humidity. The effects of moisture and of dryness upon the hair, are modified by those of heat, which act upon it, sometimes in the same

sense, and sometimes in a contrary one; so that, if it be supposed, for example, that the hair is heated about the hygrometer, on one part, this air, whose dissolving faculty with regard to the water will be augmented, will take away from the hair a portion of the water which it had imbibed, thus tending to shorten the hair; while, on the other part, the heat, by penetrating it, will tend, though much more feebly, to lengthen it; and hence the total effect will be found to consist of two partial and contrary effects, the one hygrometric, the other pyrometric. In observations which require a certain precision, it is therefore necessary to consult the thermometer at the same time with the hygrometer; and on this account, the inventor has constructed, from observation, a table of correction, which will put it in the power of philosophers always to ascertain the degree of humidity of the air, from the effect produced by the heat.

De Luc, who devoted his attention to the same object, has followed a different method. This philosopher employed for the construction of his hygrometers, a very thin slip of whale-bone, which performs the same office as the hair in the hygrometer of Saussure. He kept this whale-bone bent by means of a spring, the action of which he preferred to that of a weight: he determined the degree of extreme humidity, by immersing the slip of whale-bone entirely under water; and to fix the opposite limit, which is that of extreme dryness, he made use of calcined lime, which he enclosed with the hygrometer under a glass bell. The choice of lime is founded on this, that the calcination having produced a higher degree of dryness, if it be afterwards left to cool, so far that it may be placed without inconvenience under the glass bell destined for the experiment, it will be still found, as to sense, in the same state of dryness, since it is very slow in acquiring humidity; and thus all its absorbent faculty will be employed to dry up, by little and little, the air contained under the receiver, and to make the hygrometer itself pass to a state which approaches the nearest possible to extreme dryness.

Another hygrometer was suggested by the following circumstance: While M. Lowitz was at Dmitriewsk, in Astracan, he found on the banks of the Wolga, a thin bluish kind of slate, which attracted moisture remarkably soon, but again suffered it as soon to escape. A plate of this slate weighed, when brought to a red heat, 175 grains, and, when saturated with water, 247: it had therefore imbibed, between complete dryness and the point of complete moisture, 72 grains of water. Lowitz suspended a round thin plate of this slate at the end of a very delicate balance, fastened within a wooden frame, and suspended at the other arm a chain of silver wire, the end of which was made fast to a sliding nut that moved up and down in a small groove on the edge of one side of the frame. He determined, by trial, the position of the nut when the balance was in equilibrio, and when it had ten degrees of over-weight, and divided the space between these two points into ten equal parts, adding such a number more of these parts as might be necessary. When the stone was suspended from the one arm of the balance, and at the other a weight equal to 175 grains, or the weight of the stone when perfectly dry, the nut in the groove showed the excess of weight in grains when it and the chain were so adjusted that the balance stood in equilibrio. A particular apparatus on the same principles as a vernier, applied to the nut, showed the excess of weight to ten parts of a grain. Lowitz remarked that this hygrometer in continued wet weather gave a moisture of more than 55 grains, and in a continued heat of 113 degrees of Fahrenheit only 1½ degree of moisture.

The hygrometer thus invented by Lowitz was, however, attended with this fault, that it never threw off the moisture in the same degree as the atmosphere became drier. It was also sometimes very deceitful, and announced moisture when it ought to have indicated that dryness had again begun to take place in the atmosphere. To avoid these inconveniences, M. Hochheimer proposes the following method:

1. Take a square bar of steel about two lines in thickness, and from ten to twelve inches in length, and form it into a kind of balance, one arm of which ends in a screw. On this screw let there be screwed a leaden bullet of a proper weight, instead of the common weights that are suspended. 2. Take a glass plate about ten inches long, and seven inches in breadth, destroy its polish on both sides, free it from all moisture by rubbing it over with warm ashes, suspend it at the other end of the balance, and bring the balance into equilibrium by screwing up or down the leaden bullet. 3. Mark now the place to which the leaden bullet is brought by the screw, as accurately as possible, for the point of the greatest dryness. 4. Then take away the glass plate from the balance, dip it completely in water, give it a shake that the drops may run off from it, and wipe them carefully from the edge. 5. Apply the glass plate thus moistened again to the balance, and bring the latter into equilibrium by screwing the leaden bullet. Mark then the place at which the bullet stands as the highest degree of moisture. 6. This apparatus is to be suspended in a small box of well dried wood, sufficiently large to suffer the glass-plate to move up and down. An opening must be made in the lid, exactly of such a size as to allow the tongue of the balance to move freely. Parallel to the tongue apply a graduated circle, divided into a number of degrees at pleasure from the highest point

of dryness to the highest degree of moisture. The box must be pierced with small holes on all the four sides, to give a free passage to the air; and to prevent moisture from penetrating into the wood by rain, when it may be requisite to expose it at a window, it must either be lackered or painted. To save it at all times from rain, it may be covered, however, with a sort of roof fitted to it in the most convenient manner. But all these external appendages may be improved or altered as may be found necessary.

In Mr. Kater's Hygrometer, the hygroscopic substance is the beard of the grass known in the Canarese language, by the name of *Oobeena Hooloo*, being the *Andropogon contortum* of Linnæus. It is found throughout the Mysoor country in the month of January; which is the proper time to gather it, that it may be dried for use. The frame of the instrument is rectangular, and is constituted of small square bars of brass or silver; perpendicularly to this frame and at one end of it a square plate is soldered, having a projecting edge to secure from injury the index that is to turn upon it: on the face of the plate a circle is engraved, whose circumference is divided into one hundred equal parts. The index, which is made of fine wire, and balanced as nicely as possible, is attached to one extremity of an axis of silver wire, which has liberty not only to turn, but to slide freely in the direction of its length through double conical holes in two of the cross bars of the frame. This axis is extended to about half the length of the frame; and has a screw of fourteen or fifteen threads upon it, formed by twisting tightly round it a smaller silver wire from left to right: the index is fixed at right angles to the commencement of this screw; and a loop and drop made of fine gold wire is so formed, that when suspended from the axis, it may slide along the screw with perfect freedom, and by the number of threads it runs over, indicate the number of complete revolutions of the index. The end of the axis farthest from the index is conical (enlarging outwards), and has a notch in it to receive one end of the beard of the *Oobeena Hooloo*, which may be confined there by the pressure of a sliding ring. The other end of the beard is fastened by means of a similar slit and ring at the further extremity of the frame; this part of the apparatus being susceptible of adjustment by a screw.

By this contrivance the gradual expansion or contraction of the hygrometric substance will communicate a rotatory motion to the index, in such manner that while the graduated circle shows the divisions under a hundred, the loop and drop will indicate with equal precision the number of complete revolutions of hundreds on the scale. Thus, at the same time that the grass is superior to any other substance hitherto discovered for hygrometric purposes, the instrument makes eleven or twelve revolutions; whereas Saussure's makes little more than one revolution.

Mr. Kater recommends that all observations made with this hygrometer be reduced to what they would have been had the scale consisted of one thousand parts, or ten revolutions of the index: a circumstance which cannot always be insured by the construction of the instrument, and the determination of the extremes of dryness and moisture. The whole apparatus may be made and fixed in a portable case of three inches long. It is almost unnecessary to remark, that Mr. Kater's apparatus, which is remarkably simple, will serve full as well for many other hygrometric substances, as for the *Oobeena Hooloo*.

HYGROSCOPE. See Hygrometer.

HYLA, in ancient geography, a river of Mysia Minor, in which Hylas, the famous boy of Hercules, was drowned.

HYLÆUS. In zoology, a tribe of the genus Apis, in the entomologic system of Fabricius. See Apis.

HYLEG, in astrology, the significator.

HYLOZOISTS, formed of ὑλη *matter*, and ζωη *life*, the name of a sect of atheists among the ancient Greek philosophers, who held matter to be animated; maintaining that matter had some natural perception, without animal sensation, or reflection in itself considered; but that this imperfect life occasioned that organization whence sensation and reflection afterwards arose. Of these, some held only one life, which they called a *plastic* nature, presiding regularly and invariably over the whole corporeal universe, which they represented as a kind of large plant or vegetable: these were called the cosmoplastic and stoical atheists, because the stoics held such a nature, though many of them supposed it to be the instrument of the Deity. Others thought that every particle of matter was endued with life, and made the mundane system to depend upon a certain mixture of chance and plastic or orderly nature united together.

HY'MEN (*Hymen*, *enis*, *m.* υμην, from *Hymen*, the god of marriage, because this membrane is supposed to be entire before marriage or copulation). The hymen is a thin membrane of a semilunar or circular form, placed at the entrance of the vagina, which it partly closes. It has a very different appearance in different women, but it is generally, though not always, found in virgins, and is very properly esteemed the test of virginity, being commonly ruptured in the first act of coition; and the remnants of the hymen are called the carunculæ myrtiformes. The hymen is also peculiar to the human species. There are two circumstances relating to the hymen which require medical assistance. It is sometimes of such a strong ligamentous texture that it cannot be ruptured, and prevents the connexion between the sexes. It is also sometimes im-

perforate, wholly closing the entrance into the vagina, and preventing any discharge from the uterus; but both these cases are extremely rare. If the hymen be of an unnaturally firm texture, but perforate, though perhaps with a very small opening, the inconveniences thence arising will not be discovered before the time of marriage, when they may be removed by a crucial incision made through it, taking care not to injure the adjoining parts.

But the imperforation of the hymen will produce its inconveniences when the person begins to menstruate. For the menstruous blood, being secreted from the uterus at each period, and not evacuated, the patient suffers much pain from the distention of the parts, many strange symptoms and appearances are occasioned, and suspicions injurious to her reputation are often entertained. In a case of this kind, for which Dr. Denman was consulted, the young woman, who was twenty-two years of age, having many uterine complaints, with the abdomen enlarged, was suspected to be pregnant, though she persevered in asserting the contrary, and had never menstruated. When she was prevailed upon to submit to an examination, the circumscribed tumour of the uterus was found to reach as high as the navel, and the external parts were stretched by a round soft substance at the entrance of the vagina, in such a manner as to resemble that appearance which they have when the head of a child is passing through them: but there was no entrance into the vagina. On the following morning an incision was carefully made through the hymen, which had a fleshy appearance, and was thickened in proportion to its distention. Not less than four pounds of blood, of the colour and consistence of tar, were discharged; and the tumefaction of the abdomen was immediately removed. Several stellated incisions were afterwards made through the divided edges, which is a very necessary part of the operation; and care was taken to prevent a reunion of the hymen till the next period of menstruation, after which she suffered no inconvenience. The blood discharged was not putrid or coagulated, and seemed to have undergone no other change, after its secretion, but what was occasioned by the absorption of its more fluid parts. Some caution is required when the hymen is closed in those who are in advanced age, unless the membrane be distended by the confined menses; as the above writer once saw an instance of inflammation of the peritonæum being immediately produced after the operation, of which the patient died as in the true puerperal fever, and no other reason could be assigned for the disease.

The carunculæ myrtiformes, by their elongation and enlargement, sometimes become very painful and troublesome.

HYMENÆUS and HYMEN, the god of marriage among the Greeks, was son of Bacchus and Venus, or, of Apollo and one of the muses. The people of Athens instituted festivals in his honour, and solemnly invoked him at their nuptials, as the Latins had their Thalassius. Hymen was generally represented as crowned with flowers, holding a burning torch in one hand, and in the other a vest of a purple colour. It was supposed that he always attended at nuptials; for, if not, matrimonial connections were fatal, and ended in the most dreadful calamities; and hence people ran about, and called aloud, Hymen! Hymen! &c.

HYMENÆ. Locust-tree. In botany a genus of the class decandria, order monogynia. Calyx five-parted; petals five, nearly equal; style twisted upwards; legume filled with farinaceous pulp. Three species, two natives of South America, one of Madagascar. Of these, H. Carbaril, an American tree, sixty feet high, and three in diameter, is the most worthy of notice. The leaflets are coriaceous, leaves stiff and smooth, standing in pairs with peduncled flowers in panicles. The larger roots secrete a yellowish red, transparent gum, which is the gum-anime of the shops, and affords an excellent varnish when dissolved in rectified spirits. See ANIME GUM.

HYMENE'AL, HYMENE'AN. *s.* (ὑμέναι@). A marriage song (*Pope*).

HYMENE'AL, HYMENE'AN. *a.* Pertaining to marriage (*Pope*).

HYMENOPAPPUS. In botany, a genus of the class syngenesia, order polygamia æqualis. Receptacle naked; seeds crowned with many chaffy leaves: calyx many-leaved, spreading. One species—a native of Carolina, with terminal corymb and highly odorous flowers.

HYMENOPHY'LLUM. In botany, a genus of the class cryptogamia, order filices. Fructification in marginal, somewhat exerted crowded dots, seated on a small column, within the two-valved, flattish, straight involucase which opens outwardly. Twenty species, of which one only is indigenious to our own country, and from its having been found wild first of all at Tunbridge, specifically named, H. tunbridgense.

HYMENO'PTERA. In zoology, the fifth order in the class in sectre, according to the Linnean arrangement. See ZOOLOGY. It is thus ordinally arranged: wings four, membranaceous: females mostly armed with a sting.

HYMETTUS, in ancient geography, a mountain of Attica, near Athens; famous for its marble quarries, and for its excellent honey.

HYMN, a song, or ode, in honour of God; or a poem proper to be sung, composed in honour of some deity. See ODE, and SONG. The word is Greek, υμνος, *hymn*; formed of the verb ὑδω, *celebro*, *I celebrate.* Isidore, on this word, remarks, that hymn is properly a song of joy, full of the praises of God; by which, according to him, it is dis-

tinguished from *threna*, which is a mourning song, full of lamentation.

The hymns or odes of the ancients, generally consisted of three stanzas or couplets: the first called strophe, the second antistrophe, and the last epode.

St. Hilary, bishop of Poitiers, is said to have been the first that composed hymns to be sung in churches: he was followed by St. Ambrose. Most of those in the Roman Breviary were composed by Prudentius. They have been translated into French verse by Messrs. De Port Royal. The Te Deum is also commonly called a hymn, though it be not in verse; so also is the Gloria in excelsis.

In the Greek Liturgy there are four kinds of hymns; but then the word is not taken in the sense of a praise offered in verse, but simply of laud, or praise. The angelic hymn, or Gloria in excelsis, makes the first kind; the trisagion the second, the cherubic hymn the third, and the hymn of victory and triumph, called επινικιος, the last.

To HYMN, *v. a.* (ὑμνέω). To praise in song; to worship with hymns (*Milton*).

To HYMN, *v. n.* To sing songs of adoration (*Milton*).

HY'MNIC, *a.* (ὕμνος). Relating to hymns.

HY'O. In anatomy names compounded of this word belong to muscles which originate from, or are inserted into, or connected with the os hyoides; as, hyo-glossus, hyo-pharyngeus, genio-hyo-glossus, &c.

HYOBA'NCHE. In botany a genus of the class didynamia, order angiospermi. Calyx seven-leaved; corol ringent, without any lower lip; capsule two celled, many seeded. One species. A scarlet parasytic plant of the Cape, with ovate oblong branches.

HYO-GLOSSUS. Cerato-glossus of Douglas. Basio-cerato-chondro-glossus of Albinus. A muscle situated at the side, between the os hyoides and the tongue. It arises from the basis, but chiefly from the corner of the os hyoides, running laterally and forwards to the tongue, which it pulls inwards and downwards.

HYO'IDES os, (*Hyoides*, ὑοειδης, from the Greek letter υ, and ειδος, likeness. This bone, which is situated between the root of the tongue and the larynx, derives its name from its supposed resemblance to the Greek letter υ, and is by some writers described along with the parts contained in the mouth. Ruysch has seen the ligaments of the bone so completely ossified, that the os hyoides was joined to the temporal bones by anchylosis. In describing this bone, it may be distinguished into its body, horns, and appendices. The body is the middle and broadest part of the bone, so placed, that it may be easily felt with the finger in the fore part of the throat. Its fore part, which is placed towards the tongue, is irregularly convex, and its inner surface, which is turned towards the larynx, is unequally concave. The cornua, or horns, which are flat and a little bent, are considerably longer than the body of the bone, and may be said to form the sides of the υ. These horns are thickest near the body of the bone. At the extremity of each is observed a round tubercle, from which a ligament passes to the thyroid cartilage. The appendices, or lesser horns, cornua minora, as they are called by some writers, are two small processes, which in their size and shape are somewhat like a grain of wheat. They rise up from the articulations of the cornua with the body of the bone, and are sometimes connected with the styloid process on each side by means of a ligament. It is not unusual to find small portions of bone on these ligaments; and Ruysch, as we have already observed, has seen them completely ossified. In the fœtus, almost the whole of the bone is in a cartilaginous state, excepting a small point of bone in the middle of its body, and in each of its horns. The appendices do not begin to appear till after birth, and usually remain cartilaginous many years. The os hyoides serves to support the tongue, and affords attachment to a variety of muscles, some of which perform the motions of the tongue, while others act on the larynx and fauces.

HYOPHARY'NGEUS, (υοφαρυγγαιος; from υοειδης, the hyoid bone, and φαρυγξ, the pharynx). A muscle so called from its origin in the os hoides, and its insertion in the pharynx.

HYOSCI'AMUS, (*Hyosciamus*, *i. m.* υοςκυαμος; from υς, a swine, and κυαμος, a bean, so named because hogs eat it as a medicine, or it may be because the plant is hairy and bristly like a swine). Faba suilla, Henbane. Hog's bean.

In botany a genus of the class pentandria, order monogynia. Corol funnel-form, obtuse, irregular; stamens inclined; capsule covered with a lid, two-celled. Eight species: chiefly natives of the Levant and Palestine. One common to our own country. H. niger, found in water, with sinuate leaves clasping the stems, and sessile flowers. The smell of this indigenous plant is strong and peculiar: the leaves, when bruised, emit somewhat of the odour of tobacco: to the taste they are mild and mucilaginous. It is a powerful narcotic poison, and many instances of its deleterious effects are recorded by different authors. Nevertheless, the extract of the seeds, under proper management, may be safely employed; and it has this advantage over narcotics in general, that it never renders the bowels costive, but, on the contrary, gently opens them.

HY'OSERIS. In botany a genus of the class synquenesia, order polygamia æqualis. Receptacle naked; calyx invested with scales; down double; the outer capillary, inner of chaffy awns. Eight species; five stemless; three caulescent; all natives of the south of Europe, or Barbary, but one H. prenanthoides, which is an American plant.

HYOTHYROIDÆ, compounded of hoides, and thyroides, in anatomy, a pair

of muscles of the larynx; which, arising from the anterior part of the os hyoides, are inserted into the cartilago thyroides. They serve as antagonists to the sternothyroides, and lift up the thyroid cartilage.

To HYP. *v. a.* (barbarously contracted from *hypochondriac*). To make melancholy; to dispirit (*Spectator*).

HYPA'LLAGE, among grammarians a species of hyperbaton, consisting in a mutual permutation of one case for another. Thus Virgil says, dare classibus austros, for dare classes austris; and again, necdum illis labra admovi, for necdum illa labris admovi.

HYPA'NTE, or HYPERPANTE, a name given by the Greeks to the feast of the presentation of Jesus in the temple. This word, which signifies lowly or humble meeting, was given to this feast from the meeting of old Simeon and Anna the prophetess in the temple when Jesus was brought thither.

HY'PATE, in the ancient music, an appellation given to the lowest chord or sound of a tetrachord. The word is Greek, ὑπατη, which some Latin interpreters translate by suprema; as they translate νητη, by ultima or ima. Dr. Wallis says, that the first contrivers of these names took, contrary to our custom, the grave for the highest place, and the acute for the lowest of their schemes.

The ancients also used *Hypate-hypaton*, for the lowest chord of the lowest tetrachord: and *Hypate-meson* for the first or lowest note of the mean tetrachord.

HY'PŒTHROS, in ancient architecture, a kind of temple open at the top, and thereby exposed to the air.

HYPA'TIA, an illustrious female, was the daughter of Theon, an eminent philosopher and mathematician, at Alexandria, whom she succeeded in the government of that famous school; she had a number of disciples, among whom was the celebrated bishop Synesius. She explained to her hearers (says Socrates, an ecclesiastical historian of the 5th century, born at Constantinople) the several sciences that go under the general name of philosophy; for which reason there was a confluence to her, from all parts, of those who made philosophy their delight and study. Never was woman more caressed by the public, and yet never had woman a more unspotted character. She was held as an oracle for her wisdom, for which she was consulted by the magistrates in all important cases; a circumstance which often drew her among the greatest concourse of men, without the least censure of her manners. In short, when Nicephorus intended to pass the highest compliment on the princess Eudocia, he thought he could not do it better than by calling her another Hypatia.

While Hypatia thus reigned the brightest ornament of Alexandria, Orestes was governor of that place for the emperor Theodosius, and Cyril was bishop or patriarch. Orestes, having had a liberal education, could not but admire Hypatia; and as a wise governor often consulted her. This, together with an aversion which Cyril had against Orestes, proved fatal to the lady. About 500 monks assembling, attacked the governor one day, and would have killed him, had he not been rescued by the townsmen; and the respect which Orestes had for Hypatia causing her to be traduced among the Christian multitude, they dragged her from her chair, tore her in pieces, and burnt her limbs. This happened about the year 415.

HYPA'TOIDES, the general name given by the Greeks to their deep, or bass sounds, to distinguish them from the mesoides, or middle sounds, and the netoids, or high sounds.

HYPE'COUM. Wild cummin. In botany a genius of the class tetandria, order digynia. Calyx two-leaved; petals four, the two outer broader; fruit a cilique. Four species, natives of the south of Europe: low herbaceous plants with yellow flowers: the juice of the plant employed by some medical practitioners as a narcotic.

HYPELATE. In botany a genus of the class polygamia, order monoecia. Calyx five-leaved; corol five-petalled; filaments eight; stigma deflected, three-sided; drupe one seeded. One species; a Jamaica shrub with erect, leafy branches.

HY'PER, a Greek preposition of composition, denoting excess, its literal signification being *above* or *beyond*.

In music, we often meet with words beginning with Hyper, as *Hyper-œolian*, above the Œolian; *Hyperdorian*, above the dorian; *Hyperlolœon*, super-excellent; *Hyperionian*, above the Ionian; *Hyperphrygian*, above the Phrygian, &c.

HYPERA'NTHERA. In botany, a genus of the class decandria, order monogynia. Calyx five, parted; petals five, unequal, inserted into the calyx; legume three-valved, swelling into protuberances; seeds winged. Four species, natives of India, or South America.

HYPERBATON, or HYPERBASIS, in grammar and rhetoric, is a transposition, or a figurative construction, inverting the natural and proper order of the terms of a discourse.

The word is ὑπερβατον, or ὑπερβασις, derived of ὑπερβαινω, transgredior, I go beyond; formed of ὑπερ, ultra, beyond, and βαινω, eo, I go.

The hyperbaton, Longinus observes, is no other than a transposal of sentiments, or words, out of the natural order and method of discourse, and always implies great violence, or strength of passion, which naturally hurries a man out of himself, and distracts him variously. Thucydides is very liberal in hyperbatons.

HYPE'RBOLA, one of the conic sections, being that which is made by a plane which cuts the opposite side of the cone produced above the vertex, or, by a plane which makes a greater angle with the base than

the opposite side of the cone makes. In this figure the squares of the ordinates are *greater* than, or *exceed* the, rectangles under the parameters and abscissas, whence the name *hyperbola*.

A few useful properties of the Hyperbola.

1. The squares of the ordinates of any diameter, are to each other, as the rectangles of their abscissas.

2. As the square of any diameter is to the square of its conjugate, so is the rectangle of two abscissas, to the square of their ordinate.

3. The distance between the centre and the focus, is equal to the distance between the extremities of the tranverse and conjugate axes.

4. The difference of two lines drawn from the foci to meet in any point of the curve, is equal to the transverse axes.

5. All the parallelograms inscribed between the four conjugate hyperbolas, are equal to one another, and each equal to the rectangle of the two axes.

6. The rectangles of the parts of two parallel lines, terminated by the curve, are to one another, as the rectangles of the parts of any other two parallel lines, any where cutting the former. Or the rectangles of the parts of two intersecting lines, are as the squares of their parallel diameters, or squares of their parallel tangents.

7. All the parallelograms are equal which are formed between the asymptotes and curve, by lines parallel to the asymptotes.

For other properties, see the article Conics; and for the measure of hyperbolas, their arcs, &c. consult Hutton's Mensuration.

Hyperbola (Acute), one whose asymptotes make an acute angle.

Hyperbola (Ambigenal), is that which has one of its infinite legs falling within an angle formed by the asymptotes, and the other falling without that angle.

Hyperbola (Deficient), is a curve having only one asymptote, though two hyperbolic legs running out infinitely by the side of the asymptote, but contrary ways.

Hyperbola (Equilateral). See Equilateral Hyperbola.

Hyperbolas (Infinite), or Hyperbolas of the higher kinds, are expressed or defined by general equations similar to that of the conic or common hyperbola, only having general exponents, instead of the particular numeral ones, but so that the sum of those on one side of the question, is equal to the sum of those on the other side. Such as, $ay^{m+n} = bx^m (d+x)^n$, where x and y are the absciss and ordinate to the axis or diameter of the curve; or $x^m y^n = a^{m+n}$, where the absciss x is taken on one asymptote, and the ordinate y parallel to the other.

HYPERBOLE, in rhetoric, a figure, whereby the truth and reality of things are excessively either enlarged or diminished. Lord Kaims observes, that an object uncommon with respect to size, either very great of its kind or very little, strikes us with surprise; and this emotion forces upon the mind a momentary conviction, that the object is greater or less than it is in reality, the same effect precisely attends figurative grandeur or littleness; and hence the hyperbole, which expresses this momentary conviction. A writer, taking advantage of this natural delusion, enriches his description greatly by the hyperbole: and the reader, even in his coolest moments, relishes this figure, being sensible that it is the operation of nature upon a warm fancy.

It cannot have escaped observation, that a writer is generally more successful in magnifying by a hyperbole than in diminishing. The reason is, that a minute object contracts the mind, and fetters its powers of imagination; but that the mind dilated and inflamed with a grand object, moulds objects for its gratification with great facility. Longinus, with respect to a diminishing hyperbole, cites the following ludicrous thought from a comic poet: "He was owner of a bit of ground not larger than a Lacedemonian epistle." But, for the reason now given, the hyperbole has by far the greater force in magnifying objects; of which take the following examples:

For all the land which thou seest, to thee will I give it, and to thy seed for ever. And I will make thy seed as the dust of the earth: so that if a man can number the dust of the earth, then shall thy seed also be numbered.
Gen. xiii. 15, 16.

Illa vel intactæ segetis per summa volaret
Gramina: nec teneras cursu læsisset aristas.
Æneid. vii. 808.

——— atque imo barathri ter gurgite vastos
Sorbet in abruptum fluctus, rursusque sub auras
Erigit alternos, et sidera verberat undâ.
Æneid. iii. 421.

——— horrificis juxta tonat Ætna ruinis,
Interdumque atram prorumpit ad æthera nubem,
Turbine fumantem piceo et candente favilla:
Attollitque globos flammarum, et sidera lambit.
Æneid. iii. 571.

Hyperboles, says Seneca, lie without deceiving; they lead the mind to truth by fictions: they convey the sentiment intended, though by expressing it in terms which render it incredible. The hyperbole premises too much, in order to make you conceive enough. There is nothing faulty in an hyperbole, when it is *ultrà fidem*, as Quintillian says, provided that it be not *ultrà modum*.

Aristotle observes, that hyperboles are the favourite figures of young authors, who love excess and exaggeration; but that phi-

losophers should not use them without a great deal of reserve.

The pitch to which an hyperbole may be carried, is a point of great delicacy; to carry it too far, is to destroy it: it is of the nature of a bow-string, which by immoderate tension, slackens; and frequently has an effect quite contrary to that intended.

Those hyperboles are best, which are latent, and are not taken for hyperboles. For this reason, they should scarce ever be used but in a passion, and in the middle of some important incident: such is the hyperbole of Herodotus, speaking of the Lacedæmonians, who fought at Thermopylæ: 'They defended themselves, for some time, with the arms that were left them, and at last with their hands and teeth: till the Barbarians, continually shooting, buried them, as it were, with their arrows.' Now what likelihood is there, that naked men should defend themselves with their hands and teeth against armed men; and that so many persons should be buried under their enemies' arrows? Yet does there appear some probability in the thing, by reason it is not sought for the sake of the figure; but the *hyperbole* seems to arise out of the subject itself.

HYPERBO'LIC Conoid, a solid formed by the revolution of an hyperbola about its axis: it is otherwise called an hyperboloid.

Hyperbolic Cylindroid, a solid formed by the revolution of an hyperbola about its conjugate axis, or line through the centre perpendicular to the tranverse axis.

Hyperbolic Logarithm, a logarithm so called, as being similar to the asymptotic spaces of the hyperbola. The hyperbolic logarithm of a number, is to the common logarithm, as 2·3025850929940457 to 1, or as 1 to ·4342944819032518. The first invented logarithms, by Napier, are of the hyperbolic kind; and so are Kepler's. See Logarithm.

HYPERBO'LICAL. } a. (from *hyperbola.*)
HYPERBO'LIC. }
1. Belonging to the hyperbola; having the nature of a hyperbola (*Grew*). 2. (from *hyperbole.*) Exaggerating or extenuating beyond fact (*Boyle*).

HYPERBO'LICALLY. *ad.* 1. In form of a hyperbola. 2. With exaggeration or extenuation (*Brown*).

HYPERBO'LIFORM. *a.* (*hyperbola* and *forma*, Latin.) Having the form, or nearly the form of the hyperbola.

HYPERBO'REAN. *a.* (*hyperboreus*, Lat.) Northern.

HYPERCRI'TIC. *s.* (ὑπερ and κριτικος.) A critic exact or copious beyond use or reason (*Dryden*).

HYPERCRI'TICAL. *a.* (from *hypercritic.*) Critical beyond necessity or use (*Swift*).

HYPERIA, in ancient geography, the seat of the Phœaceans, near the Cyclops. It is thought to have been the island of Melita, or Malta.

HYPERICUM, (*Hypericum*, *i.* n. υπερικον; from ὑπερ, over, and εικων, an image or spectre; so named because it was thought to have power over and to drive away evil spirits). St. John's wort.

In botany a genus of the class polyadelphia, order polyandria. Calyx five-parted, inferior; petals five; filaments numerous, in three or five sets, united at the base; capsula many seeded. Eighty seven species scattered over the globe, of which nine or ten are common to our country. The whole may be partitioned into those,

A with five styles.
B —— three styles; calyx very entire.
C —— three styles; calyx and bractes with glandular serratures.
D —— two styles.

H. perfoliatum, with three styles, stem somewhat two-edged, leaves ovate and clasping the stem, and cymed, sessile flowers, a native of our own country, was, on account of its supposed medicinal virtues, greatly esteemed by the ancients, but is now very rarely used. The late London Pharmacopoeia retain the flowers on account of the great proportion of resinous oily matter, in which the medical efficacy of the plant is supposed to reside.

One of the most beautiful species is H. hircinum. Fetid St. John's wort, a native of Sicily, with lanceolate acute leaves, for which see Nat. Hist. Pl. CXXIX.

HYPERIDES, an orator of Greece, was the disciple of Plato and Isocrates, and governed the republic of Athens. He defended with great zeal and courage the liberties of Greece; but was put to death by Antipater's order, 322 B. C. He composed many orations, of which only one now remains. He was one of the ten celebrated Greek orators.

HYPE'RMETER. *s.* (ὑπερ and μετρον.) Any thing greater than the standard requires (*Add.*).

HYPERMNESTRA, in fabulous history, one of the fifty daughters of Danaus, king of Argos. She alone refused to obey the cruel order Danaus had given to all his daughters, to murder their husbands the first night of their marriage; and therefore saved the life of Lynceus, after she had made him promise not to violate her virginity. Danaus, enraged at her disobedience, confined her closely in prison, whence Lynceus delivered her some time after.

HYPERO'STOSIS. (*Hyperostosis*, *is*, f. υπεροςωις; from υπερ, upon, and οςεον, a bone.) See Exostosis.

HYPEROXYMURIATIC ACID. See Muriatic Acid.

HYPEROXYMURIATS. See Muriats.

HYPERSARCO'SIS. *s.* (ὑπερσάρκωσις.) The growth of fungous or proud flesh (*Wiseman*).

HY'PHEN, Ὑφεν, in grammar, an accent or character, which implies, that two words are to be joined, or connected into one compound word. As, mal-administration, &c.

Hyphens serve also to connect the syllables of such words as are divided by the end of the line.

HYPHYDRA. In botany a genus of the class Monôecia, order gynandria. Male: calyx one-leafed, three-parted; corolless; stamens six, inserted above the germ. Fem. calyxless; corolless; style triangular, with three stigmas; capsule one-celled, three-valved, seed single. One species: a Guiana plant, growing under water, with flowers in heads.

HYPNOTICS. (*Hypnotica, sc. medicamenta*, υπνωτικα; from ὑπνος, to sleep.) See Anodynes.

HYPNUM. Feather-moss. In botany a genus of the class cryptogamia, order music. Capsule ovate-oblong; fringe double; outer of sixteen broadish teeth; inner a variously divided membrane; veil smooth; fruit lateral. Ninety-three species, of which seventy-six are indigenous to our own country, and for the most part found in deep, and otherwise barren shades; but a few grow wild on old walls. They may be thus sub-divided:

A. Capsules erect; shoots cylindric.

B. Capsules erect; shoots flat; leaves two-rowed.

C. Capsule drooping; leaves two-rowed.

D. Capsule drooping; leaves imbricate every way.

E. Capsules drooping; leaves spreading every way.

F. Capsule drooping; leaves falcate, pointing one way. See Nat. Hist. Pl. CXXXVII.

HYPETHRE, in ancient architecture, two rows of pillars surrounding, and ten at each face of any temple, &c. with a peristyle within of six columns.

HYPO, ὑπο a Greek preposition retained in the composition of many words brought from that language, and literally denoting *beneath, under*. This particle is compounded with many Greek words used by ancient musical writers, as *Hypodorian, Hypo-æolian, Hypo-ionion, Hypo-lydian*, &c. Besides *Hypoproslambanomenos*, the name given to the chord added by Guido to the ancient scale, and which is a tone lower than the *Proslambanomenos*, or lowest sound of the Greeks.

HYPOÆMA, (*hypoœma, ătis*, n. υποαιμα; from ὑπο, under, and αιμα, blood, because the blood is under the cornea.) An effusion of red blood into the chambers of the eye.

HYPOCAU'STUM, among the Greeks and Romans, a subterraneous place, where was a furnace to heat the baths. The word is Greek, formed of the preposition ὑπο, under, and the verb καιω, to burn. Another sort of hypocaustum was a kind of kiln to heat their winter parlours.

HYPOCHŒ'NI. Cat's ear. In botany, a genus of the class syngenesia, order polygamia æqualis. Receptacle chaffy; calyx somewhat imbricate; down feathery. Five species: three of them common to the fields and pastures of our own country.

HYPOCHO'NDRIAC Regions, (Regiones hypochondriacæ, from ὑπο, under, and χονδρος, a cartilage.) They are situated one on each side of the epigastric region, being the spaces in the abdomen that are under the cartilages of the spurious ribs.

HYPOCHONDRI'ACAL. } *a.* (from *hypo-*
HYPOCHONDRI'AC. } *chondras.*) 1. Melancholy; disordered in the imagination (*Decay of Piety*). 2. Producing melancholy (*Bacon*).

HYPOCHONDRI'ASIS, (hypochondriasis, is, f. υποχονδριασις; from ὑποχονδριακος, one who is hipped. Hypochondriac affections. A genus of diseases in the class neuroses and order adynamiæ of Cullen; characterized by dyspepsia; languor and want of energy; dejection of mind, and apprehension of evil, more especially respecting health, without sufficient cause; with a melancholic temperament.

HYPOCI'STIS, (*hypocistis, idis*, f. υποκισιο, from υπο, under, and κισιο, the cistus.) See Hypocistidis Succus.

HYPOCI'STIDIS Succus. The juice of the hypocistis, a plant called by Linnéus, asarum hypocistis, a parasitical plant growing in warm climates, from the roots of the cistus. The juice is a mild astringent, of no particular smell nor flavour. It is seldom used. See Asarum.

HYPOCRATE'RIFORM Corol. A salver-shaped corol. Monopetalous, with the border spreading out horizontally or flat from the tube, like an old fashioned salver. As in some of the asperifoliæ; heliotropium, myosotis; in diapensia, aretia, androsace, hottonia, phlox, samolus.

Hypocrateriform, however, is a bad word, as compounded illegitimately of two distinct languages. Salver-shaped is far preferable; or, if we would preserve the former in a correct shape, it should be hypocrateroid.

HYPO'CRISY. *s.* (*hypocrisie*, Fr. ὑποκρισισ, below, or hid from judgment.) Dissimulation with regard to the moral or religious character (*Dryden. Swift*).

HY'POCRITE. *s.* (ὑποκριτησ.) 1. A dissembler in morality or religion (*Swift*). 2. A dissembler (*Philips*).

HYPOCRI'TICAL. } *a.* (from *hypocrite*.)
HYPOCRI'TIC. } Dissembling; insincere; appearing differently from the reality.

HYPOCRI'TICALLY. *ad.* With dissimulation; without sincerity (*Gov. of the Tongue*).

HYPO'GÆUM, in ancient architecture, a name given to all the parts of a building that are under ground.

Hypo'gæum, in astrology, a name given to those houses which are below the horizon.

HYPO'GALA, (*hypogala, æ*, f. υπογαλα; from υπο, under, and γαλα, milk, because it is a milk-like effusion under the cornea.) A

collection of white humour, like milk, in the chambers of the eye. There are two species of this disease: the one takes place, it is said, from a deposition of the milk, as is sometimes observed in women who suckle: the other, from the depression of the milky cataract.

HYPOGA'STRIC ARTERIES. Arteriæ hypogastricæ. See ILIAC ARTERIES.

HYPOGA'STRIC REGION, (regio hypogastrica, from ὑπο, under, and γαστηρ, the stomach.) The region of the abdomen that reaches from above the pubis to within three fingers breadth of the navel.

HYPOGLOSSI, EXTERNI, or MAJORES, in anatomy, the ninth pair of nerves, called also linguales & gustatorii.

HYPO'GLOTTIS, or HYPOGLOSSIS, composed of, ὑπο under, and γλωττα, tongue, in anatomy, is a name given to two glands of the tongue. There are four large glands of the tongue; two of them called hypoglottides, situated under it, near the venæ ranulares; one on each side of the tongue.

HYPOLITE (St.) a town of France, in the department of Gard, with a good fort. It is seated on the Vidourle. Lat. 43. 55. N. Lon. 0. 4. E.

HYPO'PIUM, (*hypopium*, i, n. υποπυον; from υπο, under, and πυον, pus; because the pus is under the cornea.) A collection of pus in the anterior or posterior chamber, or both chambers of the eye. The proximate cause of this disease is a preceding inflammation of the iris or uvea, an abscess or ulcer of the cornea. It is known by inspecting the eye: a white moveable liquid appears, occupying the chambers of the eye; the iris is partly or totally imperceptible, obscuring totally or partially the sight.

HYPOPO'DIUM, a piece of furniture in the ancient baths, on which the feet were rested.

HYPO'SCENIUM, in the Greek theatre, a partition under the logeum, appointed for the music.

HYPO'STASIS, a Greek term, literally signifying substance, or subsistance; used in theology for person. The word is Greek, ὑποστασις; compounded of ὑπο *sub*, "under," and ἱστημι *sto*, *existo*, "I stand, I exist;" *q. d. sub sistentia*. Thus we hold, that there is but one nature or essence in God, but three hypostases or persons. The term hypostasis is of a very ancient standing in the church. St. Cyril repeats it several times, as also the phrase union according to hypostasis. The first time it occurs is in a letter from that father to Nestorius, where he uses it instead of προσωπον, the word we commonly render person, which did not seem expressive enough. "The philosophers (says St. Cyril) have allowed three hypostases: they have extended the Divinity to three hypostases: they have even sometimes used the word trinity: and nothing was wanting but to have admitted the consubstantiality of the three hypostases, to show the unity of the divine nature, exclusive of all triplicity in respect of distinction of nature, and not to hold it necessary to conceive any respective inferiority of hypostases."

This term occasioned great dissensions in the ancient church; first among the Greeks, and afterwards also among the Latins. In the council of Nice, hypostasis was defined to denote the same with essence or substance; so that it was heresy to say that Jesus Christ was of a different hypostasis fom the Father; but custom altered its meaning. In the necessity they were under of expressing themselves strongly against the Sabellians, the Greeks made choice of the word hypostasis, and the Latins of persona; which change proved the occasion of endless disagreement.

HYPOSTASIS (ὑποστασις, from ὑφιστημι to subside). In medicine, the sediment in the urine.

HYPOSTA'TICAL. *a.* (from *hypostasis*). 1. Constitutive; constituent as distinct ingredients (*Boyle*). 2. Personal; distinctly personal.

HYPOSTE'MA (ὑποστημα). The same as Hypostasis.

HYPO-SYNAPHE, in music, a term applied by the ancients to the disjunction of two tetrachords by the interposition of a third, conjoint with both.

HYPOTHECA, in the civil law an obligation, whereby the effects of a debtor are made over to his creditor, to secure his debt. The word comes from the Greek ὑποθηκη, a thing subject to some obligation; of the verb ὑποτιθεμαι, *supponer*, "I am subjected;" of ὑπο *under*, and τιθημι *pono*, "I put."

HYPOTHENUSE, or rather HYPOTENUSE, ὑποτεινουσα, *subtendens*, formed of ὑποτεινω, *subtendo*, *I subtend*, in Geometry, is the longest side of a right-angled triangle; or that side which subtends, or is opposite to, the right angle.

HYPOTHESIS, ὑποθεσις, formed of ὑπο, *under*, and θεσις, *positio*, *of* τιθημι, *pono*, *I put*, in Logic, is a proposition or principle which we suppose, or take for granted, in order to draw conclusions for the proof of a point in question.

In disputation, they frequently make false hypotheses, in order to draw their antagonists into absurdities; and even in geometry truths are often deducible from such false hypotheses.

Every conditional or hypothetical proposition may be distinguished into hypothesis and thesis: the first rehearses the conditions under which any thing is affirmed or denied; and the latter is the thing itself affirmed or denied.

Thus, in the proposition, a triangle is half of a parallelogram, if the bases and altitudes of the two be equal; the latter part is the hypothesis, if the bases, &c. and the former the thesis, a triangle is half a parallelogram.

In strict logic, we are never to pass from the hypothesis to the thesis; that is, the

principal supposed must be proved to be true, before we require the consequence to be allowed.

Hypothesis, in Physics, &c. denotes a kind of system laid down from our own imagination, whereby to account for some phenomenon or appearance of nature.

Thus we have hypotheses to account for the tides, for gravity, for magnetism, for the deluge, &c.

The real and scientific causes of natural things generally lie very deep: observation and experiment, the proper means of arriving at them, are in most cases extremely slow; and the human mind is very impatient: hence we are frequently driven to feign or invent something that may seem like the cause, and which is calculated to answer the several phenomena, so that it may possibly be the true cause.

Hypothesis, in astronomy, is used in much the same sense as System. Thus we have the *Ptolemaic hypothesis*, the *Tychonic*, the *Copernican*, &c.

HYPOTHE'TICAL. } *a.* (from *hypothesis.*)
HYPOTHE'TIC. } Including a supposition; conditional (*Watts*).

HYPOTHE'TICALLY. *ad.* Upon supposition; conditionally (*Broome*).

HYPOTRACHELION, in architecture, is used for a little frize in the Tuscan and Doric capital, between the astragal and annulets; called also the colerin and gorgerin. The word is applied by some authors in a more general sense, to the neck of any column, or that part of its capital below the astragal.

HYPAXIS. In botany, a genus of the class hexandria, order monogynia. Corol six-parted, permanent, superior; capsule narrower at the base; spathe two valved. Fifteen species; two American, one Aleppo, the rest Cape bulbs.

HYPTIS. In botany, a genus of the class didynamia, order gymnospermia. Calyx five toothed; corol ringent; the upper lip cloven, lower lip three parted, with the middle division formed; stamens declined. Four species, natives of the West Indies or America.

HYRCANIA, in ancient geography, a country of the farther Asia, lying to the south-east of the Mare Hyrcanum or Caspium; with Media on the west, Parthia on the south, and Margiana on the west.

Hyrcania, in ancient geography, a town of Lydia, in the campus Hyrcanus, near Thyatira; so called from colonists brought from Hyrcania, a country lying to the south of the Caspian sea. The people called Hyrcani Macedones, because a mixed people (Pliny).—Another Hyrcania, the metropolis of the country called Hyrcania. Thought to be the Tape of Strabo, the Syrinx of Polybius, the Zeudracarta of Arrian, and the Isaac of Isidorus Characenus. A third, a strong place of Judea, built by Hyrcanus.

HYRST, Hurst, Herst. Are all from the Saxon, hẏpſt, a wood or grove (*Gibson*).

HYSSOP, in Botany. See Hyssopus.

HYSSOPUS. Hyssop, in botany a genus of the class and order didynomia, gymnospermia. Corol with the lower lip three parted; the middle segment mostly crenate; stamens straight, distant. Four species; two American; one Chinese, and one of the South of Europe. The last is best known and most cultivated. It is the H. officinalis with flowers in whorls, racemed, pointing one way; middle division of the corol two-lobed, and very entire; leaves lanceoate; the plant itself is a branching shrub. It is still esteemed among physicians as an aromatic and stimulant, but is chiefly employed as a pectoral, and has long been thought useful in humoral asthmas, coughs, and catarrhal affections; for this purpose an infusion of the leaves, sweetened with honey or sugar, is recommended to be drank as tea.

Hyssopus officinalis. The systematic name of the common hyssop. See Hyssopus.

HYSTERIA, (*Hysteria, æ*, f. υϛερια; from υϛερα, the womb). Hysterics. Hysteric passion. A genus of disease in the class neuroses, and order spasmi of Cullen. It is characterized by a grumbling noise in the belly; a ball ascending to the throat, with a sense of suffocation: stupor; insensibility and convulsions; involuntary laughing and crying; sleep interrupted by sighs; urine limpid and abundant, previous to the fit; and great sensibility and irritability of the mind. There are four species: 1. Hysteria chlorotica, from a retention of the menses. 2. Hysteria à menorrhagia, from an immoderate flow of the menses. 3. Hysteria à leucorrhœa, from the fluor albus. 4. Hysteria libidinosa, from sensual desires.

Hysteric passion. See Hysteria.

HYSTE'RIUM. In botany a genus of the class cryptogamia, order fungi. Fungus sessible hollow, with a transverse cleft at top; seeds globular, tailless, covering the disk, two species, both exotics.

HYSTEROLOGY, Ὑϛερολογια, signifying a discourse inverted, in rhetoric, a species of hyperbaton, or a vicious manner of speaking, wherein the natural order of things is inverted; called also by the Greeks ὕϛερον πρότερον; q. d. putting the first thing where the last should be.

Thus Terence uses valet & vivit, for vivit & valet. And Virgil moriamur & in media arma ruamus, for in media arma ruamus & moriamur. Quintilian exposes this fault, lib. xi. cap. 2. where he says, quædam—turpiter convertuntur, ut si peperisse narres, deinde concepisse; in quibus, si id quod posterius est dixeris de priore tacere optimum est.

HYSTERON-Proteron, Ὕϛερον πρότερον. See Hysterology.

HYSTERO'TOMY, (*Hysterotomia, æ.* f.

υςεζατομια; from υςεςα, the womb, and τεμνω, to cut). See Cæsarian Section.

Hystriciasis, (*Hystriciasis, is*, f. υςςιχιασις; from υςςιξ, a hedge-hog, or porcupine). A disease of the hairs, in which they stand erect, like porcupine quills. An account of this rare disease is to be seen in the *Phil. Trans.* No. 424.

Hystricis lapis. See Bezoar Porcinum.

Hystritis, (*Hystritis, idis*, f. υςειτις; from υςεςα, the womb.) Metritis. An inflammation of the womb. A genus of disease in the class pyrexiæ and order phlegmasiæ of Cullen; characterized by pyrexia, heat, tension, tumour, and pain in the region of the womb, pain in the os uteri when touched, and vomiting.

HYSTRIX. Porcupine. In zoology a genus of the class mammalia, order glires. Fore-teeth two, cut off obliquely; grinders eight; toes four or five; body covered with spines and hair, five species.

1. H. cristata. Crested porcupine. Fore-feet, four-toed, hind-feet, five-toed; head crested, tail short.

β A variety, with spines shorter, crest smaller.

γ A third variety with spines long, crest ample.

This species derives its name from a long crest of stiff bristles on the top of its head, reclining backwards. The quills on the hind part of the body are nine inches in length, very sharp at the ends, and varied with black and white. Between the quills there are a few hairs. Its head, belly and legs are covered with strong bristles, terminated with soft hair of a dusky colour. It has long whiskers, and ears like those of the human body; four toes before, and five behind. Its length is about two feet: its tail, which also is covered with quills, measures four inches only. It inhabits India, the sand hills to the south-west of the Caspian Sea, Southern Tartary, Persia and Palestine, and all parts of Africa. It is found wild in Italy and Spain, and is bought in the markets of Rome for the table. The Italian porcupines have shorter quills, and a less crest than those of Asia and Africa. It is harmless; lives on fruits, roots and vegetables; sleeps by day, and feeds by night. The story of its darting its quills when irritated, is fabulous: when attacked, it retires and runs its nose into a corner; rolls itself up, erects its spines, and opposes them to an assailant and makes a kind of grunting noise. Some of these animals produce a bezoar. These bezoars were once very highly valued, and have been sold for five hundred crowns a piece.

It digs large burrows divided into many compartments, with a single entrance, brings from two to four young; and is easily tamed. See Nat. Hist. Pl. CXL.

2. H. prehensilis. Brasilian porcupine. Feet four-toed, tail long, prehensile, naked beneath at the end.

β Another variety with tail longer, spines shorter.

γ A third variety smaller; head white.

The whole species have a short blunt nose, long white whiskers, and a bed of small spines beneath the nose. The top of the head, back, sides, and the base of the tail, are also covered with spines. The longest of these on the lower part of the back and tail are about three inches, very sharp, and white, baired near their points with black. They adhere close to the skin, which is quite naked between them; and are shorter and weaker as they approach the belly. On the breast, belly, and lower parts of the legs, they are converted into dark brown bristles. The tail is seven inches long, slender and taper towards the end; for the last ten inches it is almost naked, having only a few hairs upon it; but, for that space, it has a strong prehensile quality, length of the body fifteen inches.

It inhabits Mexico and Brazil: lives in the woods, and preys, not only on fruits, but also on poultry: sleeps by day, and preys by night; and generally makes a noise with its nostrils, as if out of breath: grunts also like a sow. It climbs trees, but very slowly: in descending, for fear of falling, it twists its tail round the branches: it spends no more arrows in darting its quills than the rest: grows very fat; and its flesh is very white and good. These also may be tamed.

3. H. Mexicana. Mexican porcupine. Tail long, prehensile; hind feet four-toed; spines mixed and almost hid in downy hair and long bristles: body of a dusky hue. Inhabits the mountains of Mexico; lives on fruit, and is easily tamed; eighteen inches long; tail nine.

4. H. dorsata. Canadian porcupine. Tail middle length, not prehensile; hind-feet five toed; spines on the upper part of the head, back and tail only.

Another variety with body white. Inhabits North America; digs holes under trees, climbs, feeds on fruit and bark, particularly that of the juniper; laps like a dog; in the winter eats snow instead of drinking: nearly the size of a hare.

5. H. Macroura. Long tailed porcupine. Feet five-toed; prickles clubed or jointed, tail length of the body, crowned at the tip with a tuft of long, knotted, silvery hairs; body short, thick, ears short naked; eyes large bright. Inhabits the woods of the islands of the Indian ocean.

I, J.

I, THE ninth letter of the English alphabet: it is both a vowel and a consonant; agreeably to which two different powers, it has two different forms; though, since the vowel and consonant differ in their form as well as sound, they may, as Dr. Johnson observes, be more properly accounted two letters.

I vowel has a long sound, as in *fine, thine,* which is usually marked by an *e* final; or a short sound, as *fin, thin.* Prefixed to *e* it makes a diphthong of the same sound with the soft *i*, or double *e, ee:* thus *field, yield,* are spoken as *feeld, yeeld.* Subjoined to *a* or *e* it makes them long, as *fail, deceit.* The sound of *i* before another *i*, or at the end of a word, is always expressed by *y*. When it is found before an *r*, it is generally sounded like a short *u*, as in *first, flirt, shirt.*

I, used as a numeral, signifies *one*, and stands for so many units as it is repeated times: thus I, one; II, two; III, three, &c. When put before a higher numeral it subtracts itself, as IV, four; IX, nine, &c. But when set after it, so many are added to the higher numeral as there are I's added: thus VI, is six; VIII, eight, &c. See ROMAN NOTATION.

This letter was the only vowel that was not marked over with the stroke of a pen to shew that it was long, as Scaurus himself testifies. Notwithstanding, to denote its quantity, it was drawn in length a letter bigger than the rest; as PIso, VIvus, ÆdIlis. Wherefore, of all the letters, the I was called long by synecdoche.

And thence comes it that Stamphilus, in Plautus's Aularium, being resolved to hang himself, says that he should make a long letter of his body. Lipsius explains it thus; and this explanation seems more likely than that of Lambinus, who understands it of all kinds of great letters.

Lipsius says expressly, that the I was double, to make it long as the other vowels; and it is the opinion of the most learned: though many instances to the contrary might be found, perhaps corruptly as *DivI Augusti*, in an inscription in the time of Augustus. Whence, as the I by its length only was equivalent to a real ii, *i. e.* that they should be marked in the discourse, as *Manubjs* instead of *Manubiis*; *Djs Manibus* instead of *Diis Manibus*. And thence come the contractions that are common and allowed to poets: *Di* instead of *Dij*; *urbem Patavi* instead of *Patavij*.

But the ancients noted also the quantity of this letter by the diphthong *ei*, as Victorinus says; and it was the same thing to write *DivI* for *Divei*, the *I* long and the *ei* having the same pronunciation, or very like the same. And this is testified by Priscian, when he says that this was the only way to express the *I* long. This pronunciation of *ei* was become so common amongst them, that they used it even in short words; which shews that it was not so much perhaps to note its quantity, as a certain pronunciation more full and more pleasing. Whence in old books we find still *Omneis*, not only instead of *Omnes* in the plural number, but also instead of *Omnis* in the singular.

The ancients sometimes changed the *i* into *u*; as *decumus* for *decimus, maxumus* for *maximus*, &c.

The vowel *i*, according to Plato, is proper for expressing fine and delicate, but humble things: on which account that verse in Virgil,

> "Accipiunt inimicum imbrem, remisque fatiscunt,"

which abounds in *i*'s, is generally admired.

Ainsworth remarks, somewhat differently, that this vowel, having the smallest sound as well as figure, is mostly fitly suited to low poetical images; as in that of Ovid,—*Nec mihi sunt vires inimicos pellere tectis,* where this vowel is seven times repeated.

J, used as an abbreviature, is often substituted for the whole word *Jesus*, of which it is the first letter.

I. *pronoun personal.* (*ik*, Gothick; ic, Sax. *I*, gen. *me*; plural *we*, gen. *us.*) 1. The pronoun of the first person, myself. 2. *I* is more than once, in *Shakspeare*, written for *ay*, or *yes*.

To JA'BBER. *v. n.* (*gabberen*, Dutch). To talk idly; to chatter (*Swift*).

JA'BBERER. *s.* (from *jabber*.) One who talks inarticulately or unintelligibly (*Hudib.*).

JABESH-GILEAD, was the name of a city in the half-tribe of Manasseh, beyond Jordan. Eusebius places it 6 miles from Pella; consequently, it was eastward of the sea of Tiberias.

JABIRIC, in ornithology. See MYCTERIA.

JABLUNKA, a town of Silesia, in the territory of Teschen. Lat. 49. 41 N. Lon. 18. 10 E.

JABOK, a brook on the eastern side of Jordan, which rises in the mountains of Gilead, and falls into Jordan near the sea of Tiberias.

JABORO'SA. In botany, a genus of the class pentandria, order monogynia. Corol tubular. Calyx five-cleft, short; stamens inserted into the throat; stigma capitate; berry three-celled. Two species, natives of Bonara, with a one-flowered scape.

JACA TREE, in botany. See ARTOCARPUS.

JACAGMAR, or JACAMAR, in ornithology. See GALBULA.

JACANA, in zoology. See PARRA.

JACCA, an ancient town of Spain, in Arragon, with a bishop's see, and a fort. It is seated among mountains of the same name, which are a part of the Pyrenees. Lat. 42. 36 N. Lon. 0. 9 W.

JA'CENT. *a.* (*jacens*, Lat.) Lying at length (*Wotton*).

JACINTH, in botany. See HYACINTHUS.

JACINTH, in oryctology. See HYACINTHUS.

JACK. *s.* (*jaques*, French.) 1. The diminutive of *John*. Used as a general term of contempt for saucy or paltry fellows (*Shaks.*). 2. The name of instruments which supply the place of a boy, as an instrument to pull off boots (*Watts*). 3. An engine which turns the spit (*Wilkins*). 4. A young pike (*Mortimer*). 5. (*jaque*, Fr.) A coat of mail (*Hayward*). 6. A cup of waxed leather (*Dryden*). 7. A small bowl thrown out for a mark to the bowlers (*Bentley*). 8. A part of a musical instrument called a virginal (*Bacon*). 9. The male of animals (*Arbuth.*). 10. A support to saw wood on (*Ainsworth*). 11. The colours or ensign of a ship (*Ainsw.*). 12. A cunning fellow (*Cleaveland*).

JACK, in mechanics, an instrument of common use for raising heavy timber, or very great weights of any kind.

The common kitchen jack is a compound engine, where the weight is the power applied to overcome the friction of the parts, and the weight with which the spit is charged; and a steady and uniform motion is obtained by means of the fly.

JACK, in naval affairs, a sort of flag, or colours, displayed from a staff erected on the outer end of a ship's bowsprit. In the British navy the jack is a small union flag; but in merchant-ships the union is bordered with red.

JACK, (Smoke.) See SMOKE JACK

JACK IN THE BOX, a large wooden male screw, turning in a female one, which forms the upper part of a strong wooden box, shaped like a frustum of a pyramid. It is used by means of levers passing through holes in it, as a press in packing, and for other purposes.

JACK BY THE HEDGE, in botany. See ALLIARIA.

JACK DAW, in ornithology. See CORVUS.

JACK IN A BOX, in botany. See HERNANDRIA.

JACK SNIPE, in ornithology. See SCOLOPAX.

JACK PUDDING. *s.* (*jack* and *pudding.*) A zany; a merry Andrew (*Guardian*).

JACK WITH A LANTHERN. *s.* An *ignis fatuus*.

JACKAL, in zoology. See CANIS.

JA'CKANAPES. *s.* (*jack* and *ape.*) 1. A monkey, an ape. 2. A coxcomb; an impertinent.

JA'CKET. *s.* (*jacquet*, French.) 1. A short coat; a close waistcoat (*Spenser*) 2. *To beat one's* JACKET, is to beat the man (*L'Estrange*).

JACOB, the son of Isaac and Rebecca, was born about 1836 B.C. He was the favourite of his mother, by whose advice he imposed upon his father, and obtained his blessing, having before taken an advantage of Esau, and purchased his birthright. To avoid the fury of Esau he fled to Padan-aran, where he resided with his uncle Laban, whom he served fourteen years for his daughters Leah and Rachel. He afterwards returned to Canaan possessed of great wealth, and a reconciliation took place between him and his brother. He died in Egypt, whither he had gone to reside with his beloved son Joseph, 1689 B C. His name was altered to Israel by an angel, and from thence his posterity were called Israelites.

JACOB (Ben Naphthali), a famous rabbi of the 5th century: he was one of the principal massorets, and bred at the school of Tiberias in Palestine with Ben Aser, another principal massoret. The invention of points in Hebrew to serve for vowels, and of accents to facilitate the reading of that language, is ascribed to these two rabbis; and said to be done in an assembly of the Jews held at Tiberias, A.D. 476.

JACOB (Giles), an eminent law-writer, born at Romsey in the county of Southampton, in 1686. He was bred under a considerable attorney; and is principally known for his Law Dictionary in one vol. folio, which has been often printed; a new and improved edition having been given by counsellors Ruffhead and Morgan, and more lately by Mr. Tomlins. Mr. Jacob also wrote two dramatic pieces; and a Poetical Register, containing the lives and characters of English dramatic poets. He died in 1744.

JACOB'S LADDER, in botany. See POLEMONIUM.

JACOB'S STAFF. *s.* 1. A pilgrim's staff. 2. Staff concealing a dagger. 3. A cross-staff; a kind of astrolabe.

JACOBÆA. Ragwort. Senecio jacobæa of Linnéus. The leaves of this common plant have a roughish, bitter, sub-acrid taste, extremely nauseous. A decoction is said to have been of infinite service in the cure of epidemic camp-dysentery. See SENECIO.

JACOBÆA LILY, in botany. See AMARYLLIS.

JACOBINE MONKS. See DOMINICANS.

JACOBINS, the name assumed by a party or club at the beginning of the French revolution, composed of members of the National Assembly. During the height of political fervour in this country from 1793 to 1798, the term was applied to those who were supposed to favour French measures or French principles.

JACOBITES, a term of reproach bestowed on the persons who, vindicating the doctrines

of passive obedience and non-resistance with respect to the arbitrary proceedings of princes, disavowed the Revolution in 1688, and asserted the supposed rights and adhered to the interests of the abdicated king James and his family.

Jacobites, in church history, a sect of Christians in Syria and Mesopotamia; so called, either from Jacob a Syrian who lived in the reign of the emperor Mauritius, or from one Jacob a monk who flourished in the year 550. The Jacobites are of two sects, some following the rites of the Latin church, and others continuing separated from the church of Rome. There is also a division among the latter, who have two rival patriarchs.

JACOBUS, a gold coin, worth 25 shillings. It was first struck in the reign of James I. of England: whence the name. This is the old Jacobus; the new Jacobus is more properly called Carolus.

JACQUINIA. In botany, a genus of the class pentandria, order monogynia. Corol ten-cleft: stamens inserted into the receptacle; berry one-seeded. Five species: one a tall tree of Montserrat from twenty-four to thirty feet high; erect, with very numerous racemes. The other four, shrubs of America or the West-Indies.

JACTITA'TION. *s.* (*jactito*, Latin.) 1. Tossing motion; restlessness (*Harvey*). 2. A term in the canon law for a false pretension to marriage.

JACULA'TION. s. (*jaculatio*, Latin.) The act of throwing missive weapons (*Milt.*).

JADE. *s.* 1. A horse of no spirit; a hired horse; a worthless nag (*Pope*). 2. A sorry woman: in contempt (*Swift*). 3. A young woman: in irony (*Addison*).

Jade, in mineralogy. See Serpentinus.

To Jade. *v. a.* (from the noun.) 1. To tire; to harass; to dispirit; to weary (*Shak.*). 2. To overbear; to crush; to degrade (*Shak.*). 3. To employ in vile offices (*Shakspeare*). 4. To ride; to rule with tyranny (*Shakspeare*).

To Jade. *v. n.* To lose spirit; to sink (*South*).

JA'DISH. *a.* (from *jade.*) 1. Vitious; bad: as a horse (*Southern*). 2. Unchaste; incontinent (*L'Estrange*).

JAEN, a handsome town of Spain, in Andalusia, with a bishop's see, and a strong castle. Lat. 37. 38 N. Lon. 3. 22 W.

JAFFA, an ancient town of Palestine, in Asia, formerly called Joppa. Lat. 32. 16 N. Lon. 35. 0 E.

JAFFATEEN ISLANDS, the name of four small islands, in the Red Sea.

JAFNAPATAM, a seaport of Ceylon, at the N. end of that island, and 100 miles N. of Candy. Lat. 9. 47 N. Lon. 80. 45 E.

JAG. *Lacinia.* In botany, a division or cleft in a leaf, calyx, or corol. This term relates chiefly to monophyllous calyxes and monopetalous corols. These are named bifid, trifid, &c. according to the number of jags.

JAGARNAUT, a famous pagoda lying on the Bay of Bengal; remarkable not only as an object of Hindoo veneration, but as an excellent sea-mark. Lat. 19. 35 N. Lon. 85. 40 E.

JAGERNDORF, a town and castle of Silesia, capital of a province of the same name. Lat. 50. 4 N. Lon. 17. 24 E.

To JAGG. or Jag. *v. a.* (*gagaw*, slits or holes, Welsh.) To cut into indentures; to cut into teeth like those of a saw (*Watts*).

Jagg. *s.* (from the verb.) A protuberance or denticulation (*Ray*).

JAGGED. Laciniatus. In botany, cleft or divided. A jagged leaf. Folium laciniatum. Divided irregularly, and the parts subdivided indeterminately.

JA'GGY. *a.* (from *jagg.*) Uneven; denticulated (*Addison*).

JA'GGEDNESS. *s.* (*from jagged.*) The state of being denticulated; unevenness (*Peacham*).

JAGGERNAUT, a black pyramidal stone worshipped by the Gentus, who pretend that it fell from heaven on the place where their temple stands.

JAGHIRE OF THE CARNATIC, a tract of land, in the peninsula of Hindustan, subject to the English East India Company. It extends along the bay of Bengal, from Madras to lake Pullicate on the N., to Alemparvé on the S., and to Conjeveram on the W.; being 108 miles along the shore, and 47 inland in the widest part. The term Jaghire means, generally, a grant of land from a sovereign to a subject, revokable at pleasure, but generally a life-rent. But the Jaghire of the Carnatic, major Rennell thinks, is understood to be held in perpetuity. It contains 2440 square miles, and its revenue is about 150,000l. per annum.

JAGO (St.), a large river of South America, which rises in the audience of Quito and Peru. It is navigable; and falls into the South Sea, after having watered a fertile country abounding in cotton-trees, and inhabited by wild Americans.

Jago (St.), the largest, most populous and fertile, of the Cape Verd islands, on the coast of Africa, and the residence of the Portuguese viceroy. It lies about 13 miles eastward from the island of Mayo, and abounds with high barren mountains; but the air, in the rainy season, is very unwholesome to strangers. Its produce is sugar, cotton, wine, and some excellent fruits. The animals are black cattle, horses, asses, deer, goats, hogs, &c.

Jago (Richard), an ingenious poet, was vicar of Snitterfield in Warwickshire, and rector of Kimcote in Liecestershire. He was the intimate friend and correspondent of Mr. Shenstone, contemporary with him at Oxford, and, it is believed, his schoolfellow; was of University College; took the degree of M. A. July 9, 1739; was author of several poems in the 4th and 5th volumes of Dodsley's Poems; published a sermon, in 1755, "the Causes of Impenitence considered, preached May 4, 1755, at Harbury in Warwickshire," where he was vicar, on occasion of a conversation said to have passed between one of the inhabitants and an apparition in the chur-chyard there;

wrote Edge-hill, a poem, for which he obtained a large subscription in 1767; and was also author of Labour and Genius, 1768, 4to; of The Blackbirds, a beautiful elegy in the Adventurer; and of many other ingenious performances. He died May 28, 1781.

JAGO DE NATA DE LOS CAVELLEROS, (St.) a town of Terra Firma in South America.

JAGO (St.), or ST. JAGO DE LA NEUSTRIA ESTRAMADURA, the capital of Chili, in South America; it was founded in 1541. Lat. 34. 10 S. Lon. 71. 5 W.

JAGO DE LOS VALLES, (St.) a town of Panuco, in New Spain. Lat. 23. 0 N. Lon. 100. 0 W.

JAGO DE CUBA, (St.) once he capital of the island of Cuba, in the West Indies. It was nearly destroyed by an earthquake in 1776. Lat. 20. 0 N. Lon. 76. 44 W.

JAGO DE LA VEGA, or SPANISH TOWN, a town of Jamaica, where the Assembly and the grand courts of justice are held. It was once a populous place, containing two churches, a monastery, and several chapels; but is now reduced to a small compass, and has only one church, and a chapel. It is seated in a pleasant valley, one the Rio Cobre. Lat. 18. 6 N. Lon. 76. 49 W.

JAGODNA, a town of Turkey in Europe, in Servia. Lat. 44. 15 N. Lon. 20. 54 E.

JAGUEER, in East India affairs, any pension from the Grand Mogul, or king of Delhi; generally such as are assigned for military services. The holder, or possessor of a jagueer, is called a Jagueerdar. This last word comes from three Persian words: *Ja*, a place; *gueristun*, to take; and *dashtun*, to hold; *quasi*, a place-holder or pensioner.

JAIL. *s.* (*geole*, Fr.) A gaol; a prison; a place where criminals are confined (*Dryden*).

JAIL FEVER, a very dangerous distemper of the contagious kind, arising from the putrescent disposition of the blood and juices.

JA'ILBIRD. *s.* (*jail* and *bird.*) One who has been in a jail

JA'ILER. *s.* (from *jail.*) The keeper of a prison (*Sidney*).

JAKES. A privy.

JALAPA or JALAP. See JALAPIUM.

JALAPIUM, (*Jalapium*, from Chalapa or Xalapa in New Spain, whence it is brought.) Mechoacanna nigra. Jalap. The plant from which this root is obtained is the Convolvulus jalapa; caule volubili; foliis ovatis subcordatis obtusis obsolete repandis subtus villosis; pedunculis unifloris. Hort. Kew. Class pentandria, order monogynia. A native of South America. In the shops the root is found both cut into slices and whole, of an oval shape, solid, ponderous, blackish on the outside, but gray within, and marked with several dark veins, by the number of which, and by its hardness, heaviness, and dark colour, the goodness of the root is to be estimated. It has scarcely any smell, and very little taste; but to the tongue, and to the throat, manifests a slight degree of pungency. The medicinal activity of jalap resides principally, if not wholly, in the resin, which, though given in small doses, occasions violent tormina. The root powdered, is a very common, efficacious, and safe purgative, as daily experience evinces; but according as it contains more or less resin, its effects must of course vary. In large doses, or when joined with calomel, it is recommended as an anthelmintic and hydrogogue. In the pharmacopœias this root is ordered in the form of tincture and extract; and the Edinburgh college directs it also in powder with twice its weight of crystals of tartar. See CONVOLVULUS.

JALAPPA ALBA. See MECHOACANNA.

JALEMUS, Ιαλεμος, in antiquity, a kind of mournful song, used upon occasion of death, or any other affecting accident. Hence the Greek proverbs had their original, ιαλεμυ οικροτερος, or ψυχροτερος, i. e. more sad or colder than a jalemus; εις τυς ιαλεμυς εγγραπτεος, worthy to be ranked among jalemuses.

JALLINDAR, a town of Hindustan Proper, capital of a district of the same name. Lat. 30. 50 N. Lon. 74. 10 E.

JALOFFS, or YALOFFS, are an active, powerful, and warlike people, inhabiting great part of that tract of Africa which lies between the Senegal and the Mandingo states on the Gambia. Their noses, says Mr. Park, are not so much depressed, nor their lips so protuberant, as those of the generality of Africans; and though their skin is of the deepest black, they are considered by the white traders as the most sightly Negroes in that part of the continent where they live. They are divided into several independent states or kingdoms, which are frequently at war with their neighbours or with each other. In their manners, superstitions, and government, they have a greater resemblance to the Mandingoes than to any other nation; but excel them in the manufacture of cotton cloth, spinning the wool to a finer thread, weaving it in a broader loom, and dyeing it of a better colour. They make very good soap, by boiling ground nuts in water, and then adding a ley of wood-ashes. They likewise manufacture excellent iron, which they carry to Bondou to barter for salt. Their language is said to be copious and significant, and is often learned by Europeans trading to Senegal. From the names of their numerals, as given by Mr. Park, it would appear that their numeration proceeds by fives as ours does by tens.

JAM. *s.* A conserve of fruits boiled with sugar and water.

JAMADAR, an officer of horse or foot, in Hindustan. Generally, a superintendant.

JAMAGOROD, a strong town of Ingria, in the Russian government of St. Petersburgh. Lat. 59. 25 N. Lon. 73. 40 E.

JAMAICA, an island of the West Indies, discovered by Christopher Columbus in his second voyage, in 1494: after a slight dispute with the natives, he took possession of it for the king of Spain, preserving the word Jamaica, by which it was called by the Indians. In the year 1655, Jamaica was taken by the En-

glish, under the command of Penn and Venables. Jamaica is about 120 miles from east to west, and 42, where broadest, from north to south, and is thought to contain near five million acres. It is divided by a ridge of mountains which run through the whole island, from east to west, from which rise innumerable rivers, well stored with fish of various kinds, and navigable for canoes. On the mountains grow great varieties of trees, such as cedars, lignum vitæ, mahogany, &c. The climate of Jamaica is more temperate, and the weather more variable, than in the Caribbee islands, and there is no country between the tropics where the heat is less troublesome. All the year round, the mornings are excessively hot, till about eight o'clock, when the easterly breeze begins to blow, and gradually increases till about twelve, when it is generally the strongest, and lasts till two or three, when it begins to die away till about five, when it is quite spent, and returns no more till the next morning. About eight in the evening, begins a land-breeze, which blows four leagues into the sea, and continues increasing till twelve at night; after which it decreases till four in the morning, when no more of it is to be felt till next night. Storms used to be very rare here, till within this century. Every night here are piercing dews, which are reckoned very unwholesome, especially to new-comers, who are too apt to expose themselves; but in the plains, or sandy places near the sea, there are few if any fogs. The rains are violent, and the drops very large. The tides are scarce discernible, their increase or decrease depending mostly on the winds, and not according to the age of the moon. The days and nights here are almost of an equal length all the year round. Not half the island is cultivated; natural productions are sugar, ginger, cotton, coffee, indigo, pimento, cocoa, several kinds of wood, some medicinal drugs, and tobacco; maize, or Indian corn, Guinea-corn, peas of various sorts, fruits in abundance, as oranges, lemons, limes, shaddocks, citrons, pomegranates, pine-apples, melons, &c. Jamaica is divided into three counties, Middlesex, Surry, and Cornwall, in which are six towns, and twenty-seven villages; St. Jago de la Vega, or Spanish Town, is the capital of the island, where the chief justice resides. The legislature of Jamaica is composed of the captain general or commander, a council, and house of assembly. The number of negroes in the year 1787, amounted to 250,000, the number of whites 30,000, freed negroes and people of colour 10,000, and Maroons 1400, in all 291,400. In the year 1787, the exports from Jamaica were 840,548 cwt. of sugar, 2,543,025 gallons of rum, 6416 gallons of molasses, 616,444 lbs. of pimento, 6395 cwt. of coffee, 1,906,467 lbs. of cotton wool, 27,623 lbs. of indigo, 4816 of ginger, 82 cwt. of cocoa, 18,140 lbs. of tobacco, 5878 tons of mahogany, and 6701 tons of logwood, with sundry other articles, to the value of 147,286*l*. sterling, amounting in the whole to the sum of 2,136,442l. 17s. 3d. sterling, at the current London prices. The imports of the same year, amounted to the sum of 1,496,232l. 5s. 4d. The centre of the island is situated Lon. 76. 45 W. Greenwich, Lat. 18. 12 N.

Jamaica, a town of Africa, in the island of York, built by a mulatto, the son of an Englishman, where the English have a factory.

Jamaica bark. See Chinchini caribæa.

Jamaica pepper. See Pimento.

JAMB. *s.* (*jambe*, French.) Any supporter on either side, as the post of a door (*Moxon*).

JAMBI, a seaport, and small kingdom, on the E. coast of Sumatra, where the Dutch have a fort. Lat. 0. 59 N. Lon. 102. 35 E.

IAMBIC, in ancient poetry, a sort of verse, so called from its consisting either wholly, or in great part, of iambuses. See Iambus. Ruddiman makes two kinds of iambic, viz. dimeter and trimeter; the former containing four feet, and the latter six. And as to the variety of their feet, they consist wholly of iambuses, as in the two following verses of Horace:

1 2 3 4 5 6
Dim. *Inar* | *sit æ* | *stuo* | *sius* |
Trim. *Suis* | *& i* | *psa Ro* | *ma vi* | *ribus* | *ruit.*

Or, a dactylus, spondeus, anapestus, and sometimes tribrachys, obtain in the odd places; and the tribrachys also in the even places, excepting the last. Examples of all which may be seen in Horace; as,

Dimeter.

1 2 3 4 5 6
Canidi | *a tra* | *ctavit* | *dapes* |
Vide | *re prope* | *rantes domum* |

Trimeter.

Quò quò | *scele* | *sti rui* | *tis aut* | *cur dex* | *teris.*
Prius | *que cæ* | *lum si* | *det in* | *ferius* | *mari.*
Aliti | *busat* | *que cani* | *bus homi* | *cid' He* | *ctorem.*
Pavidum | *que lepo* | *r'aut ad* | *venam laqueo* | *gruem.*

JAMBLICUS, the name of two celebrated Platonic philosophers, one of whom was of Colchis, and the other of Apamea in Syria. The first, whom Julian equals to Plato, was the disciple of Anatolius and Porphyry, and died under the reign of the emperor Constantine.—The second also enjoyed great reputation. Julian wrote several letters to him, and it is said he was poisoned under the reign of Valens. It is not known to which of the two we ought to attribute the works we have in Greek under the name of Jamblicus, viz. 1. The history of the life of Pythagoras, and the sect of the Pythagoreans. 2. An exhortation to the study of philosophy. 3. A piece under the name of Abamon, against Porphyry's letter on the mysteries of the Egyptians.

JAMBOLIFERA, in botany; a genus of the monogynia order, belonging to the octandria class of plants; and in the natural method ranking with those of which the order is doubtful. The calyx is quadridented; the corol tetrapetalous, and funnel-shaped; the filaments a little plane; the stigma simple.

IAMBUS, in the Greek and Latin prosody, a poetical foot, consisting of a short syllable followed by a long one; as in

Θεω λεγω, *Dei*, *meas*.

Syllaba longa brevi subjecta vocatur iambus, as Horace expresses it; who also calls the iambus, a swift, rapid foot, *pes citus*.

The word, according to some, took its rise from Iambus, the son of Pan and Echo, who invented this foot; or, perhaps, who only used sharp-biting expressions to Ceres, when afflicted for the death of Proserpine. Others rather derive it from the Greek ιος, *venenum*, poison; or from ιαμβιζω *maledico*, I rail or revile; because the verses composed of iambuses were at first only used in satire.

JAMES (St.), the Great, the son of Zebedee and Salome, was called to the apostleship with his brother John the Evangelist, while they were mending their nets with their father. He was put to death by Herod Agrippa, A.D. 44 (*Watkins*).

JAMES (St.), the Less, another apostle of Jesus Christ. He obtained the name of Just, on account of his virtues. He was the first bishop of Jerusalem, and was put to death at the instigation of Ananias the high-priest, A.D. 62. There is among the canonical epistles an excellent one by this apostle, addressed to the dispersed Israelites (*Watkins*).

JAMES VI. of Scotland, and the first of England, was the son of Henry Stuart by Mary daughter of James V. and was born in 1566. The year following he was proclaimed king on the forced resignation of his mother, and in 1603 he succeeded queen Elizabeth on the English throne. A plot was soon after discovered to have seized upon him and prince Henry, for which lords Cobham and Grey, and sir Walter Raleigh, were apprehended and indicted. But the year following a more dreadful one was providentially found out, which had been devised by some desperate papists to blow up the king, the prince, and parliament, while his majesty was delivering his speech from the throne. For this several persons were executed. In 1606 he established episcopacy in Scotland, and made peace with Spain. In 1612 his son, the excellent prince Henry, died, and the same year his daughter was married to Frederic the elector palatine. James stretched the prerogative as far as he could well go, and left the consequences to be rued by his son Charles, whom he imprudently suffered to visit Spain to marry the infanta. One of the greatest blots of his reign was the execution of sir Walter Raleigh, fifteen years after sentence. James was a man of learning, which he owed to his tutor George Buchanan. He died at Theobalds in 1625, and was interred at Westminster. The court flatterers called him the Solomon of the age, and the same title was given to him by archbishop Williams in his funeral sermon. James wrote many books; as, a Commentary on the Revelations, in which he calls the pope antichrist; Basilicon Doron, or advice to his son; Dæmonology, or a Discourse on Witchcraft; a Counterblast against Tobacco, &c. all of which were printed in 1 vol. folio. (*Watkins*).

JAMES II. king of England, was the second son of Charles I. and was born at London in 1633, and immediately created duke of York. He resided during the Usurpation in France, where he imbibed the principles of popery. At the Restoration he returned to England, and married secretly Anne Hyde daughter of the earl of Clarendon. In the Dutch war he signalized himself as commander of the English fleet, and shewed great skill and bravery. On the death of his first wife he married the princess of Modena. He succeeded his brother in 1684, but his zeal for his religion leading him into measures subversive of the constitution, the prince of Orange, who had married his daughter Mary, was called over, and the king, finding himself abandoned by all his friends, withdrew to France, where he died at St. Germains in 1701. His son James, commonly called the pretender, died at Rome in 1766. His son Charles Edward, who invaded Scotland in 1745, died in 1788. Henry Benedict Stuart, cardinal York, was the last surviving branch of this unfortunate race (*Watkins*).

JAMES (Dr. Robert), an English physician of great eminence, and particularly distinguished by the preparation of a most excellent fever-powder, was born at Kinverston in Staffordshire, A.D. 1703: his father was a major in the army, his mother a sister of Sir Robert Clarke. He was of St. John's college in Oxford, where he took the degree of A.B. and afterwards practised physic at Sheffield, Lichfield, and Birmingham successively. Then he removed to London, and became a licentiate in the college of physicians; but in what years we cannot say. At London he applied himself to writing as well as practising physic; and published a Medicinal Dictionary in 3 vols. folio, and many lesser works.

JAMES'S DAY (St.), a festival of the christian church, observed on the 25th of July, in honour of St. James the greater.

JAMES (Epistle of St.), a canonical book of the New Testament, being the first of the Catholic or General Epistles; which are so called because they are not written to one but to several christian churches. See EPISTLE.

This general epistle is addressed partly to the believing and partly to the infidel Jews; and is designed to correct the errors, soften the ungoverned zeal, and reform the indecent behaviour of the latter; and to comfort the former under the great hardships either they were then suffering, or were shortly after to suffer, for the sake of Christianity.

JAMES'S POWDER, a medicine prepared by Dr. James, of which the basis has been long known to chemists, though the particular receipt for making it lay concealed, till made public by Dr. Monro in his Medical and

Pharmaceutical Chemistry. The following (Dr. Monro informs us) is a copy of the receipt, extracted from the Records of Chancery; the inventor, when he took out a patent for selling his powder, having sworn, in the most solemn manner, that it was the true and genuine receipt for preparing it:

'Take antimony, calcine it with a continued protracted heat, in a flat, unglazed earthen vessel, adding to it from time to time a sufficient quantity of any animal oil and salt, well dephlegmated; then boil it in melted nitre for a considerable time, and separate the powder from the nitre, by dissolving it in water.'

This extract Dr. Monro accompanies with the following observations. "When the Doctor first administered his powder, he used to join one grain of the following mercurial preparation to thirty grains of his antimonial powder; but in the latter part of his life he often declared that he had long laid aside the addition of the mercurial. His mercurial, which he called a pill, appears by the records of chancery to have been made in the following manner: 'Purify quicksilver by distilling it nine times from an amalgam, made with martial regulus of antimony, and a proportional quantity of sal ammoniac; dissolve this purified quicksilver in spirit of nitre, evaporate to dryness, calcine the powder till it becomes of a gold-colour; burn spirits of wine upon it, and keep it for use.' Dr. James, at the end of the receipt given into chancery, says, 'The dose of these medicines is uncertain; but in general thirty grains of the antimonial and one grain of the mercurial is a moderate dose. Signed and sworn to by Robert James.'"

There is the greatest reason to believe, however, that the medicine sold subsequent to the recording of this receipt in chancery, was not made conformably to it. From an analysis made by Dr. Higgins, the London college have introduced into their new Pharmacopœia, an imitation of Dr. James's powder, under the title of PULVIS ANTIMONIALIS, which see

"It has been called Dr. James's Fever Powder (continues Dr. Monro), and many have believed it to be a certain remedy for fevers, and that Dr. James had cured most of the patients whom he attended, and who recovered, by the use of this powder. But the bark, and not the antimonial powder, was the remedy which Dr. James almost always trusted to for the cure of fevers: he gave his powders only to clear the stomach and bowels; and after he had effected that, he poured in the bark as freely as the patient could swallow it. The Doctor believed all fevers to be more or less of the intermitting kind; and that if there was a possibility of curing a fever, the bark was the remedy to effectuate the cure; for if the fever did not yield to that, he was sure that it would yield to no other remedy whatever, as he has more than once declared to me when I have attended patients in fevers along with him."

JAMES ISLAND, an island of Africa, 30 miles up the river Gambia. It is about a mile in circuit: on it the English have a fort and factory.

JAMES RIVER, a fine river of Virginia, which enters the Chesapeak bay, near Hampton.

JAMES TOWN, a borough of Ireland, in the county of Leitrim, seated on the Shannon Lat. 53. 51 N. Lon. 8. 29 W.

JAMYN (Amadis), a French poet, who was secretary and private reader to Charles IX. and died about 1585. Besides his poetical works, he wrote some academical discourses in prose, and completed the translation of the Iliad into French verse, which had been left imperfect by Salel.

JANEIRO. See RIO JANEIRO.

To JA'NGLE. *v. n.* (*jangler*, French.) To altercate; to quarrel; to bicker in words.

To JA'NGLE. *v. a.* To make to sound untuneably (*Prior*).

JA'NGLER. *s.* (from *jangle*.) A wrangling, chattering, noisy fellow.

JANICULUM & JANICULARIUS MONS, one of the seven hills at Rome, joined to the city by Ancus Martius, and made a kind of citadel. It is famous for the burial of king Numa and the poet Italicus. Porsenna, king of Etruria, pitched his camp on mount Janiculum, and the senators took refuge there in the civil wars to avoid the resentment of Octavius. *Liv.* &c.

JA'NIZARY. *s.* (a Turkish word.) One of the guards of the Turkish king (*Waller*).

JANNA, a territory of Turkey in Europe, in Macedonia, bounded on the S by Livadia, on the W. by Albania, and on the E. by the Archipelago. It is the Thessalia of the ancients, and Larissa is the capital.

JANNA, a town in the province of Janna. Lat. 39. 48 N. Lon. 21. 36 E.

JANOWITZ, a town of Bohemia, in the circle of Kaushim. Lat. 49. 45 N. Lon. 15. 38 E.

JANSEN (CORNELIUS), bishop of Ypres, one of the most learned divines of the 17th century, and principal of the sect called from his name Jansenists. He was born in Holland of Catholic parents, and studied at Louvain. Being sent to transact some business of consequence relating to the university, into Spain, the Catholic king, viewing with a jealous eye the intriguing policy of France, engaged him to write a book to expose the French to the Pope as no good Catholics, since they made no scruple of forming alliances with Protestant states. Jansen performed this task in his Mars Gallicus; and was rewarded with a mitre, being promoted to the see of Ypres in 1635. He had, among other writings, before this, maintained a controversy against the Protestants upon the points of grace and predestination; but his Augustinus was the principal labour of his life, on which he spent above 20 years. See the next article.

JANSENISTS, in church history, a sect of the Roman Catholics in France, who follow the opinions of Jansen in relation to grace and predestination.

In the year 1640, the universities of Louvain and Douay, and particularly Father Molina and Father Leonard Celsus, thought fit to condemn the opinions of the Jesuits on grace and free-will. This having set the controversy on foot, Jansenius opposed to the doctrine of the Jesuits the sentiments of St. Augustine, and wrote a treatise on grace, which he entitled Augustinus. This treatise was attacked by the Jesuits, who accused Jansenius of maintaining dangerous and heretical opinions; and afterwards, in 1642, obtained of Pope Urban VIII. a formal condemnation of the treatise wrote by Jansenius: when the partisans of Jansenius gave out that this bull was spurious, and composed by a person entirely devoted to the Jesuits. After the death of Urban VIII. the affair of Jansenism began to be more warmly controverted, and gave birth to an infinite number of polemical writings concerning grace; and what occasioned some mirth, was the titles which each party gave to their writings: one writer published "The Torch of St. Augustin," another found "Snuffers for St. Augustin's Torch," and Father Vernon formed "A Gag for the Jansenists," &c. Inthe year 1650, sixty-eight bishops of France subscribed a letter to Pope Innocent X. to obtain an inquiry into, and condemnation of, the five following propositions, extracted from Jansenius's Augustinus: 1. Some of God's commandments are impossible to be observed by the righteous, even though they endeavour, with all their power, to accomplish them. 2. In the state of corrupted nature, we are incapable of resisting inward grace. 3. Merit and demerit in a state of corrupted nature, does not depend on a liberty which excludes necessity, but on a liberty which excludes constraint. 4. The semipelagians admitted the necessity of an inward preventing grace for the performance of each particular act, even for the beginning of faith; but they were heretics in maintaining that this grace was of such a nature, that the will of man was able either to resist or obey it. 5. It is semipelagianism to say, that Jesus Christ died, or shed his blood, for all mankind, in general.

JANSSEN (Victor Honorius), an historical painter, was born at Brussels in 1664. He was patronised by the duke of Holstein, who sent him to Rome to improve himself. On his return to his own country, he adorned most of the churches and convents with his works. He died in 1739.

JANSSENS (Cornelius), a celebrated Dutch painter, resided in England many years, and is said in many respects to be equal to Vandyke. His paintings are easily distinguished by their smooth, clear, and delicate tints, and by that character of truth and nature with which they are strongly marked. The time of his birth is not known: he died in 1685.

JA'NTY. *a.* (corrupted from *gentil*, French.) Showy; fluttering (*Spectator*).

JANUARIUS (St.), the patron saint of Naples, where his head is occasionally carried in procession, in order to stay the eruption of Vesuvius. The liquefaction of his blood is a famous miracle at Naples. The saint suffered martyrdom about the end of the third century. When he was beheaded, a pious lady of Naples caught about an ounce of his blood, which has been carefully preserved in a bottle ever since, without having lost a single grain of its weight. This, of itself, were it equally demonstrable, might be considered as a greater miracle than the circumstance on which the Neapolitans lay the whole stress, viz. that the blood, which has congealed, and acquired a solid form by age, is no sooner brought near the head of the saint, than, as a mark of veneration, it immediately liquefies. This experiment is made three different times every year, and is considered by the Neapolitans as a miracle of the first magnitude.

JANUARY, the first month of the year, according to the computation now used in the West, and containing 31 days; so called by the Romans from Janus, one of their divinities, to whom they gave two faces; because on the one side, the first day of this month looked towards the new year, and on the other towards the old one.

JANUS, in pagan worship, the first king of Italy, who, it is said, received Saturn into his dominions, after his being driven from Arcadia by Jupiter. He tempered the manners of his subjects, and taught them civility, and from him they learned to improve the vine, to sow corn, and to make bread. After his death, he was adored as a god. This deity was thought to preside over all new undertakings. Hence, in all sacrifices, the first libations of wine and wheat were offered to Janus, and all prayers prefaced with a short address to him. At his festival, the Romans offered cakes of new meal and salt, with new wine and frankincense. Janus was represented with two faces, either to denote his prudence, or that he views at once the past and approaching years; he had a sceptre in his right hand and a key in his left, to signify his extensive authority, and his invention of locks.

The Romans built but three temples and a little chapel to Janus. The first temple was built by Romulus, after he had concluded a peace with the Sabines, and there he erected a statue of Janus with two faces, to shew that both the Roman and Sabine nations were joined together; or else to signify, that the two kings, Romulus and Tatius, were but one head to govern the same commonwealth. This temple was built in the Roman Field; and Procopius says, that in his time, it remained yet in the middle of that field, over against the capitol, with a little niche of brass, and two doors like a tabernacle, wherein a statue of Janus five feet high was set up. Numa ordered that the gates of the temple should be shut in time of peace, and open in time of war; for the consul appointed to command the army, being upon his departure, went into this temple attended by the senate, the chief people of the city, and his soldiers in military dresses, and opened the

gates of the temple. This ceremony was but seldom performed; for this temple continued open during the space of seven hundred and twenty-four years, till the time of Augustus, who took possession of Egypt. This temple was shut but three times; the first time was during the reign of Numa Pompilius; the second in the time of the consulate of Titus Manlius Torquatus, and C. Attilius Balbus, seven or eight years after the first Punic war; and the third time was about seven hundred and twenty-four years after the foundation of Rome, nine and twenty years before the birth of our Lord, and towards the end of the reign of Augustus.

The new consuls took possession of their office in this temple; wherefore it was said that they opened the year.

The second temple of Janus was built by Cn. Duillius in the herb-market, after the first Carthaginian war; but being half ruined, it was built again by the emperor Tiberius, as Tacitus says.

The third temple was erected under the name of Janus Quadrifrons, some say by Numa, and others by Augustus, in the ox-market, in a little valley called Velabrum, betwixt the capitol and mount Aventinus. Marlianus affirms, that this temple was built neither by Numa nor Augustus, because in his time it was still almost entire; it being incredible it had lasted so long, had it been built by one of them. However, it may be said that it was built by Numa, and rebuilt by Augustus. This temple was of a square figure, of the Ionick order, all marble, dedicated to Janus Quadrifrons, or four-faced.

The Romans, after taking the city of Faleria in Tuscany, having found a statue of Janus with four faces, made one after its likeness for the city of Rome, and erected them a temple with four fronts; and twelve altars, to represent the four seasons, and the twelve months of the year.

JAO-TCHEOU-FOU, a city of China, in the province of Kiang-si, seated on the river Po.

JAPAN, a large empire in the most eastern part of Asia. It is composed of several islands which lie between the latitudes of 30. and 40 N. and the longitudes of 130 and 144 E. The chief of these islands, called Niphon, was discovered in 1542, by the Portuguese, who were cast on shore by a tempest. The whole empire is divided into seven principal countries, which are subdivided into 70 provinces. It is the richest country in the world for gold, and the air and water are very good. It produces a great deal of rice, which they reap in September; and millet, wheat, and barley, which they get in in May. Cedars are common, and so large that they are proper for the masts of ships and columns for temples. They have a large quantity of porcelain, silk, and skins; as also red pearls, which are not in less esteem than the white. In short, Japan is accounted one of the best countries in Asia. The inhabitants are naturally ingenious, and have a happy memory; but their manners are diametrically opposite to those of the Europeans. Our common drinks are cold, and theirs are all hot; we uncover the head out of respect, and they the feet; we are fond of white teeth, and they of black; we get on horseback on the left side, and they on the right; and they have a language so peculiar that it is understood by no other nation. The sciences are highly esteemed among them, and they have several schools at different places. Those they study most, are arithmetic, rhetoric, poetry, history, and astronomy. Some of their schools at Meaco have each 3 or 4000 scholars. They treat the women with great severity, and punish adultery with death; yet a man may take as many wives as he pleases. The Japanese are naturally good soldiers, and skilful at shooting with a bow: however, as they inhabit nothing but islands, they are seldom at war with their neighbours. They formerly carried on a trade with the neighbouring countries, but now all communication with others is forbidden, especially with Christians; for they do not look upon the Dutch to be such. Their emperor is called Dairo; and in the minority of one of them, in 1150, when they had civil wars, one of the competitors for the crown assumed the ecclesiastical government, retaining the same title; while the other, who ruled in civil affairs, was called Cuba; and things have remained on the same footing to this day. The Dairo is the chief emperor, and confers the dignity upon the other, as if he were his vassal. He resides at Meaco, and has no lands: but he has a right of selling titles and dignities. His army generally consists of 100,000 foot, and 20,000 horse, exclusive of those maintained by his vassals. His ordinary revenue is immense. The palace of the emperor is at Jeddo in the island of Niphon, and it is the capital of the whole. The inhabitants trade with none but the Chinese, Coreans, the country of Jedso, and with the Dutch. The commodities exported from thence are rice, silk and cotton wrought, fine porcelain, and japan-work; gold and silver, though not in such quantities as formerly; copper wrought and in bars; iron, steel, and other base and artificial metals; variety of rich furs, mostly brought from the land of Jedso; tea of all sorts, and much finer and better cured than that of China; a great variety likewise of medicinal herbs, roots, woods, and gums, well preserved; to these we may add diamonds and other precious stones, pearls of exquisite beauty, coral, great quantities and variety of fine sea-shells, and ambergrise, which they had so little esteem for, that they called it by no better name than cusuranosu, or excrements of the whale. In exchange for these commodities, the Hollanders bring them glasses of all sorts; raw and wrought silks, raw hides, hempen and woollen cloths, quicksilver, borax, antimony, and spices of all kinds, of which they make an immense gain, not only in Japan, but in all other parts of India. They likewise import thither some sorts of sugar, musk, camphor, siampan, brasil and other woods, calambac, elephants' teeth, and a great number of small wares, which

come from China, Thibet, and Siam; china, gin-seng, and other medicinal roots, from Tartary. All these commodities are imported or exported custom-free. The Dutch are strictly watched, and kept under severe restraint, from the time of their arrival to that of their sailing away.

JAPAN EARTH. See CATECHU.

JAPA'N. *s.* (from Japan in Asia.) Work varnished and raised in gold and colours.

To JAPA'N. *v. a.* (from the noun). 1. To varnish, to embellish with gold and raised figures (*Swift*). 2. To black and gloss shoes (*Gay*).

JAPA'NNER. *s.* (from *japan*). 1. One skilled in japan work 2. A shoeblacker (*Pope*).

JAPANNING is properly the art of varnishing and painting ornaments on wood, in the same manner as is done by the natives of Japan.

The substances which admit of being japanned are almost every kind that are dry and rigid, or not too flexible; as wood, metals, leather, and paper, prepared for the purpose.

Wood and metals do not require any other preparation, but to have their surfaces perfectly even and clean; but leather should be securely strained, either on frames or on boards; as its bending, or forming folds, would otherwise crack and force off the coats of varnish. Paper should be treated in the same manner, and have a previous strong coat of some kind of size; but it is rarely made the subject of japanning till it is converted into *papier maché* or wrought by other means into such form, that its original state, particularly with respect to flexibility, is changed.

One principal variation from the method formerly used in japanning is, the omitting any priming, or under-coat, on the work to be japanned. In the older practice, such a priming was always used; the use of which was to save in the quantity of varnish, by filling up the inequalities in the surface of the substance to be varnished. But there is a great inconvenience arising from the use of it; that the Japan coats are constantly liable to be cracked, and peeled off, by any violence, and will not endure near so long as the articles which are japanned without any such priming.

Of the nature of Japan grounds.—When a priming is used, the work should first be prepared by being well smoothed with fish-skin or glass-paper, and, being made thoroughly clean, should be brushed over once or twice with hot size, diluted with two-thirds water, if it is of the common strength. The priming should then be laid on as even as possible, and should be formed of a size, of a consistency between the common kind and glue, mixed with as much whiting as will give it a sufficient body of colour to hide the surface of whatever it is laid upon, but not more. This must be repeated till the inequalities are completely filled up, and then the work must be cleaned off with Dutch rushes, and polished with a wet rag.

When wood or leather is to be japanned, and no priming is used, the best preparation is, to lay two or three coats of coarse varnish, composed in the following manner:

Take of rectified spirit of wine one pint, and of coarse seed-lac and resin each two ounces; dissolve the seed-lac and resin in the spirit, and then strain off the varnish.

This varnish, as well as all others formed of spirit of wine, must be laid on in a warm place; and if it can be conveniently managed, the piece of work to be varnished should be made warm likewise; and for the same reason, all dampness should be avoided; for either cold or moisture chills this kind of varnish, and prevents its taking proper hold of the substance on which it is laid.

When the work is so prepared, or by the priming with the composition of size and whiting above described, the proper japan ground must be laid on, which is much the best formed of shell-lac varnish, and the colour desired, except white, which requires a peculiar treatment: and if brightness is wanted, then also other means must be pursued.

The colours used with the shell-lac varnish may be any pigments whatever, which give the tint of the ground desired; and they may be mixed together to form browns or any compound colours.

As metals never require to be undercoated with whiting, they may be treated in the same manner as wood or leather, when the undercoat is omitted, except in the instances particularly spoken of below.

White Japan Grounds.—The forming a ground perfectly white, and of the first degree of hardness, remains hitherto a desideratum, or matter sought for, in the art of Japanning; as there are no substances, which form a very hard varnish, but what have too much colour not to deprave the whiteness when laid on of a due thickness over the work.

The nearest approach, however, to a perfect white varnish, already known, is made by the following composition:

Take flake white, or white lead, washed over and ground up with a sixth of its weight of starch, and then dried; and temper it properly for spreading with the mastich varnish prepared as under the article VARNISH.

Lay these on the body to be japanned, prepared either with or without the undercoat of whiting, in the manner as above ordered; and then varnish it over with five or six coats of the following varnish:

Provide any quantity of the best seed-lac; and pick out of it all the clearest and whitest grains, reserving the more coloured and fouler parts for the coarse varnishes, such as that used for priming or preparing wood or leather. Take of this picked seed-lac two ounces, and of gum-animi three ounces; and dissolve them, being previously reduced to a gross powder, in about a quart of spirit of wine, and strain off the clear varnish.

The seed-lac will yet give a slight tinge to this composition, but cannot be omitted where the varnish is wanted to be hard; though,

when a softer will answer the end, the proportion may be diminished, and a little crude turpentine added to the gum-animi, to take off the brittleness.

A very good varnish, free entirely from all brittleness, may be formed by dissolving as much gum-animi as the oil will take, in old nut or poppy oil; which must be made to boil gently when the gum is put into it. The ground of white colour itself may be laid on in this varnish, and then a coat or two of it may be put over the ground; but it must be well diluted with oil of turpentine when it is used. This, though free from brittleness, is nevertheless liable to suffer by being indented or bruised by any slight strokes; and it will not well bear any polish, but may be brought to a very smooth surface without, if it be judiciously managed in the laying it on.

Blue Japan Grounds.—Blue japan grounds may be formed of bright Prussian blue, or of verditer glazed over by Prussian blue, or of smalt. The colour may be best mixed with shell-lac varnish, and brought to a polishing state by five or six coats of varnish of seed-lac; but the varnish, nevertheless, will somewhat injure the colour by giving to a true blue a cast of green, and fouling in some degree a warm blue by the yellow it contains: where, therefore, a bright blue is required, and a less degree of hardness can be dispensed with, the method before directed in the case of white grounds must be pursued.

Red Japan Grounds.—For a scarlet japan ground, vermilion may be used: but the vermilion has a glaring effect, that renders it much less beautiful than the crimson produced by glazing it over with carmine or fine lake; or even with rose-pink, which has a very good effect used for this purpose. For a very bright crimson, nevertheless, instead of glazing with carmine, the Indian lake should be used, dissolved in the spirit of which the varnish is compounded, which it readily admits of when good: and, in this case, instead of glazing with the shell-lac varnish, the upper or polishing coats need only be used; as they will equally receive and convey the tinge of the Indian lake, which may be actually dissolved by spirit of wine: and this will be found a much cheaper method than the using carmine. If, nevertheless, the highest degree of brightness be required, the white varnishes must be used.

Yellow Japan Grounds.—For bright yellow grounds, the king's yellow or the turpeth mineral should be employed, either alone or mixed with fine Dutch pink: and the effect may be still more heightened by dissolving powdered turmeric root in the spirit of wine, of which the upper or polishing coat is made; which spirit of wine must be strained from off the dregs before the seed-lac be added to it to form the varnish.

The seed-lac varnish is not equally injurious here, and with greens, as in the case of other colours; because, being only tinged with a reddish yellow, it is little more than an addition to the force of the colours.

Yellow grounds may likewise be formed of the Dutch pink only; which, when good, will not be wanting in brightness, though extremely cheap.

Green Japan Grounds.—Green grounds may be produced by mixing the king's yellow and bright Prussian blue, or rather the turpeth mineral and Prussian blue; and a cheap but fouler kind by verdegris, with a little of the above-mentioned yellows, or Dutch pink. But where a very bright green is wanted, the crystals of verdegris, called distilled verdegris, should be employed; and to heighten the effect they should be laid on a ground of leaf-gold, which renders the colour extremely brilliant and pleasing.

They may, any of them, be used successfully with good seed-lac varnish, for the reason before given: but will be still brighter with white varnish.

Orange-coloured Japan Grounds.—Orange-coloured japan grounds may be formed by mixing vermilion or red lead with king's yellow or Dutch pink; or the orange lac, which will make a brighter orange ground than can be produced by any mixture.

Purple Japan Grounds.—Purple japan grounds may be produced by the mixture of lake and Prussian blue; or a fouler kind, by vermilion and Prussian blue. They may be treated as the rest with respect to the varnish.

Black Japan Grounds to be produced without Heat.—Black grounds may be formed by either ivory-black or lamp-black: but the former is preferable where it is perfectly good.

These may be always laid on with shell-lac varnish; and have their upper or polishing coats of common seed-lac varnish, as the tinge or foulness of the varnish can be here no injury.

Common Black Japan Grounds on Iron or Copper, produced by means of Heat. For forming the common black japan grounds by means of heat, the piece of work to be japanned must be painted over with drying oil; and when it is of a moderate dryness, must be put into a stove of such degree of heat as will change the oil to black, without burning it so as to destroy or weaken its tenacity. The stove should not be too hot when the work is put into it, nor the heat increased too fast; either of which errors would make it blister: but the slower the heat is augmented, and the longer it is continued, provided it be restrained within the due degree, the harder will be the coat of japan. This kind of varnish requires no polish, having received, when properly managed, a sufficient one from the heat.

The fine Tortoise-shell Japan Ground produced by means of Heat.—The best kind of tortoise-shell ground produced by heat is not less valuable for its great hardness, and enduring to be made hotter than boiling water without damage, than for its beautiful appearance. It is to be made by means of a varnish prepared in the following manner:—Take of good linseed-oil one gallon, and of umbre half a pound: boil them together till the oil become very brown and thick: strain it then through

a coarse cloth, and set it again to boil; in which state it must be continued till it acquire a pitchy consistence; when it will be fit for use.

Having prepared thus the varnish, clean well the iron or copper plate or other piece which is to be japanned; and then lay vermilion tempered with shell-lac varnish, or with drying oil diluted with oil of turpentine, very thinly, on the places intended to imitate the more transparent parts of the tortoise-shell. When the vermilion is dry, brush over the whole with the black varnish, tempered to a due consistence with oil of turpentine; and when it is set and firm, put the work into a stove, where it may undergo a very strong heat, and must be continued a considerable time; if even three weeks, or a month, it will be the better.

This was given amongst other receipts by Kunckel; but appears to have been neglected till it was revived with great success in the Birmingham manufactures, where it was not only the ground of snuff-boxes, dressing-boxes, and other such lesser pieces, but of those beautiful tea-waiters which have been so justly esteemed and admired in several parts of Europe where they have been sent This ground may be decorated with painting and gilding, in the same manner as any other varnished surface, which had best be done after the ground has been duly hardened by the hot stove; but it is well to give a second annealing with a more gentle heat, after it is finished.

Method of painting Japan Work.—Japan work ought properly to be painted with colours in varnish; though, in order for the greater dispatch, and, in some very nice works in small, for the freer use of the pencil, the colours are sometimes tempered in oil; which should previously have a fourth part of its weight of gum-animi dissolved in it; or, in default of that, of the gums sandarac or mastich. When the oil is thus used, it should be well diluted with spirit of turpentine, that the colours may be laid more evenly and thin; by which means, fewer of the polishing or upper coats of varnish become necessary.

In some instances, water-colours are laid on grounds of gold, in the manner of other paintings; and are best, when so used, in their proper appearance, without any varnish over them; and they are also sometimes so managed as to have the effect of embossed work. The colours employed in this way, for painting, are best prepared by means of isinglass size corrected with honey or sugar-candy. The body of which the embossed work is raised, need not, however, be tinged with the exterior colour, but may be best formed of very strong gum-water, thickened to a proper consistence by bole-armenian and whiting in equal parts; which being laid on the proper figure, and repaired when dry, may be then painted with the proper colours tempered in the isinglass size, or in the general manner with shell-lac varnish.

Manner of varnishing Japan Work.—The last and finishing part of japanning lies in the laying on and polishing the outer coats of varnish; which are necessary, as well in the pieces that have only one simple ground of colour, as with those that are painted. This is in general best done with common seed-lac varnish, except in the instances and on those occasions where we have already shown other methods to be more expedient: and the same reasons which decide as to the fitness or impropriety of the varnishes, with respect to the colours of the ground, hold equally with regard to those of the painting; for where brightness is the most material point, and a tinge of yellow will injure it, seed-lac must give way to the whiter gums; but where hardness and a greater tenacity are most essential, it must be adhered to; and where both are so necessary that it is proper one should give way to the other in a certain degree reciprocally, a mixed varnish must be adopted.

This mixed varnish, as we have already observed, should be made of the picked seed-lac. The common seed-lac varnish, which is the most useful preparation of the kind hitherto invented, may be thus made: Take of seed-lac three ounces, and put it into water to free it from the sticks and filth that are frequently intermixed with it; and which must be done by stirring it about, and then pouring off the water, and adding fresh quantities in order to repeat the operation, till it be freed from all impurities, as it very effectually may be by this means. Dry it then, and powder it grossly, and put it, with a pint of rectified spirit of wine, into a bottle of which it will not fill above two-thirds. Shake the mixture well together; and place the bottle in a gentle heat, till the seed appear to be dissolved; the shaking being in the mean time repeated as often as may be convenient: and then pour off all that can be obtained clear by this method, and strain the remainder through a coarse cloth. The varnish thus prepared must be kept for use in a bottle well stopt.

When the spirit of wine is very strong, it will dissolve a greater proportion of the seed-lac; but this will saturate the common, which is seldom of a strength sufficient for making varnishes in perfection. As the chilling, which is the most inconvenient accident attending those of this kind, is prevented, or produced more frequently, according to the strength of the spirit; we shall therefore take this opportunity of showing a method by which weaker rectified spirits may with great ease at any time be freed from the phlegm, and rendered of the first degree of strength.

Take a pint of the common rectified spirit of wine, and put it into a bottle of which it will not fill above three parts. Add to it half an ounce of pearl-ashes, salt of tartar, or any other alkaline salt, heated red hot, and powdered as well as it can be without much loss of its heat. Shake the mixture frequently for the space of half an hour: before which time, a great part of the phlegm will be separated from the spirit, and will appear, together with the undissolved part of the salts, in the bottom of the bottle. Let the spirit then be poured off,

or freed from the phlegm and salts, by means of a tritorium or separating funnel; and let half an ounce of the pearl-ashes, heated and powdered as before, be added to it, and the same treatment repeated. This may be done a third time, if the quantity of phlegm separated by the addition of the pearl-ashes appear considerable. An ounce of alum reduced to powder and made hot, but not burnt, must then be put into the spirit, and suffered to remain some hours; the bottle being frequently shaken: after which, the spirit, being poured off from it, will be fit for use.

The addition of the alum is necessary, to neutralize the remains of the alkaline salt or pearl-ashes; which would otherwise greatly deprave the spirit with respect to varnishes and laquer, where vegetable colours are concerned; and must consequently render another distillation necessary.

The manner of using the seed-lac or white varnishes is the same, except with regard to the substance used in polishing; which, where a pure white or great clearness of other colours is in question, should be itself white: whereas the browner sorts of polishing dust, as being cheaper, and doing their business with greater dispatch, may be used in other cases. The pieces of work to be varnished should be placed near a fire, or in a room where there is a stove, and made perfectly dry; and then the varnish may be rubbed over them by the proper brushes made for that purpose, beginning in the middle, and passing the brush to one end; and then with another stroke from the middle, passing it to the other. But no part should be crossed or twice passed over, in forming one coat, where it can possibly be avoided. When one coat is dry, another must be laid over it; and this must be continued at least five or six times, or more, if on trial there is not sufficient thickness of varnish to bear the polish, without laying bare the painting or ground-colour underneath.

When a sufficient number of coats is thus laid on, the work is fit to be polished; which must be done, in common cases, by rubbing it with a rag dipped in tripoli, or rottenstone, finely powdered; but towards the end of the rubbing, a little oil of any kind should be used along with the powder; and when the work appears sufficiently bright and glossy, it should be well rubbed with the oil alone, to clean it from the powder, and give it a still brighter lustre.

JAPARA, a seaport on the N. coast of the island of Java, with a good harbour. Lat. 6. 20 S. Lon. 110. 45 E.

JAPO'NICA TERRA. See CATECHU.

JAPYDIA, in ancient geography, a western district of Illyricum. It now constitutes the S. part of Carniola, and the W. of Austrian Croatia.

To JAR. *v. n.* (from *guerre*, war, Fr.) 1. To strike together with a kind of short rattle (*Dryden*) 2. To strike or sound untuneably (*Roscommon*). 3. To clash; to interfere; to act in opposition; to be inconsistent (*Dryden*). 4. To quarrel; to dispute (*Spenser*).

JAR. *s.* (from the verb.) 1. A kind of rattling vibration of sound (*Hold.*). 2. Clash of interests; discord; debate (*Spenser*). 3. A state in which a door unfastened may strike the post (*Swift*). 4. (*giarro*, Ital.) An earthen vessel (*Dryden*).

JAR, or IJAR, in chronology, the eighth month of the Hebrew civil year, and the second of the sacred: it had twenty-nine days, and answered to part of our April and May.

JARDES, JARDONS, hard callous swellings in the hinder legs of a horse, seated on the outsides of the hough, as the spavin is on the inside. This disease is more to be feared than the spavin. It is not very common, so that but few people know it, though it be as painful as the spavin, and equally makes a horse halt. In this case there is no remedy but firing, which does not always succeed; though repellents may be useful in an early stage of the complaint. If upon the fore sinew of the leg, between the spavin on the inside and the jardon without, there be a circle that joins them, and encompasses the nerve of the instep, the horse is spoiled and ruined beyond all recovery.

JARDYN (Karel du), an excellent painter of landscapes and animals, was born at Amsterdam in 1640. He studied in Italy, where he acquired a great reputation. He resided at Venice, and died in 1678: and so greatly was he esteemed, that, though a Protestant, his remains were permitted to be interred in consecrated ground.

JARGON, in mineralogy. See CIRCONIUS.

JARGON. *s.* (Fr.) Unintelligible talk; gabble; gibberish (*Bramhall*).

JARGONE'LLE. See PYRUS.

JARNAC, a town of France, in the department of Charente. Lat. 45. 43 N. Lon. 0. 4 W.

JAROSLOW, a town of Austrian Poland, in Red Russia, with a strong citadel. It has a noted annual fair. Lat. 50. 4 N. Lon. 22. 43 E.

JARRETIER, in the manage, an obsolete French word signifying a horse whose houghs grow too close together.

JASHAWK, a young hawk. See FALCO.

JASIO'NE. Sheep's sea briars. In botany, a genus of the class pentandria, order monogynia. Involucre many-leaved; calyx five-toothed; corol wheel-shaped, five-parted, with linear segments; stigma clavate, notched; anthers united at the base; capsule inferior, imperfectly two-celled, bursting at the top. One species: found wild on the sandy pastures of our own country; an annual herbaceous plant. There is a variety indigenous to the south of France; perennial, with linear, smoothish, flat, rather obtuse leaves.

JASMINE, in botany. See JASMINUM.

JASMINE (Cape), in botany. See GARDENIA.

JASMINE (Bastard), in botany. See CESTRUM.

JASMINE (Scarlet), in botany. See BIGNONIA.

JASMINE (Red), in botany. See PLUMARIA.

JASMINE (Persian), in botany. See SYRINGA.

JASMI'NUM. Jasmine. In botany, a genus of the class diandria, order monogynia. Corol salver-shaped, from five to eight-cleft; berry two-grained; seeds solitary, arillate. Twenty-one species; chiefly natives of the East Indies, several of the Cape, and one or two of the Levant. They may be thus subdivided:

A. Leaves simple.
B. Leaves ternate.
C. Leaves pinnate.

The following are chiefly worthy of notice:

1. J. officinale. Common white jasmine. Leaves opposite, pinnate; leaflets pointed, broad, entire; buds nearly erect; stem shrubby, climbing, branched; peduncles few-flowered; flowers white, odorous; tube of the corol long. A native of India.

2. J. fruticans. Leaves opposite in threes; leaflets ovate, and somewhat heart-shaped, obtuse; branches weak and angular; segments of the calyx subulate; flowers yellow, succeeded frequently by berries of a black hue. Shrubby stem rising about ten feet. A native of the Levant.

3. J. humile. Common yellow jasmine. Leaves alternate, acute, in threes, and pinnate; branches angular; segments of the calyx very short, flowers yellow, sometimes succeeded in our own country by berries.

The third species is easily propagated by suckers or layers. The fourth may be propagated by budding or inarching upon the common white jasmine, on which it thrives well, and is hardier than those budded upon the parent stock. The fifth and sixth species may be propagated like the second.

JASPER, in mineralogy. See GEMMA and JASPIS.

JASPIS, in mineralogy, a genus of the class earths, order siliceous. Consisting of silica, a smaller proportion of alumine, and a small quantity of oxyd of iron, with generally a little magnesia and potash; hardish, opaque, breaking into indeterminate fragments, of a conchoidal texture, lightish, sometimes detached, sometimes a principal ingredient of ancient mountains; of a common form; losing its colour in the fire. Five species.

1. J. Ægyptia. Egyptian pebble, Thomson; silex hæmachates, Linnéus; caillou d'Egypte, Cronstadt: Egyptischer jaspis, Werner. Of a dull colour, varied with differently coloured concentric stripes or layers, and black dendritic figures. Found near Suez in Egypt, and sometimes in Hungary, generally in rather long, oval, flattish pebbles, and enveloped in a coarse rough crust: colour a liver brown, glittering when broken, the fragments irregularly angular and opaque, and taking a fine polish: the concentric stripes or bands are various shades of yellow, reddish, green, or white, but the dots and dendritic figures are always black. It is made into vases, snuff-boxes, and other ornaments, in common with agate.

2. J. fasciata. Ribband jasper. Striped jasper. Band jaspis, Werner. Jaspe rubané, Broch. In differently coloured, alternate parallel layers, without lustre internally, of an imperfect conchoidal texture. Found in Siberia, in Saxony, near Gnautstein and Wolftitz, and particularly fine at Ural, in large amorphous masses, forming long layers; colours yellowish, greenish-grey, ochraceous; isabella-yellow, brownish-red, pale or dark flesh-red, mountain or dark-green, generally disposed in parallel layers, which are commonly straight, rarely curved, very seldom in oblong spots: when broken, exhibits a dull imperfectly conchoidal surface, and is sometimes semi-transparent on the edges; takes a hish polish.

3. J. porcellana. Porcellanite, Kirwan; porzellan jaspis, Werner. Hard, rifly internally, of an imperfectly conchoidal fracture, inclining to uneven. Found in large compact layers, and frequently between the fissures of basalts in Bohemia and Saxony: has an acrid appearance when broken, like dried clay, and is full of cracks or slits.

4. J. vulgaris. Common jasper. Gemeiner jaspis, Werner. Hardish, shining, or polished internally, of one uniform colour, or veined or spotted, thus constituting two or three varieties. Found in Germany, Saxony, Silesia, Hungary, &c. in large compact masses, sometimes coarsely interspersed in alternate layers with other stones, and often in obtuse angular pieces; colours different; shades of black, white, yellow, red, brown, and green; frequently enriched with iron or gold ores; admits a fine polish; fracture conchoidal, sometimes imperfectly foliated.

5. J. opal. Opal jasper. Opal jaspis, Werner. Found in nests near Tokay in Hungary, in the neighbourhood of Constantinople, and in the Kolyvan mountains in Siberia. Colour red or brown, rarely ochraceous yellow; uniform, or disposed in dots, veins, or clouds; lustrous internally; fracture flat and conchoidal; moderately hard, brittle, and easily frangible. This species appears to be a connecting link between jasper and opal.

JASSELMERE, a town of Hindustan Proper, in the province of Agimere. Lat. 27. 34 N. Lon. 73. 0 E.

JASSY, the capital of Moldavia, and residence of the hospodar of that country, who is a vassal of the grand signior. It is seated on the Pruth. Lat. 47. 8 N. Lon. 27. 35 E.

JATROPHA. Physic nut. In botany, a genus of the class monœcia, order monadelphia. Male calyxless; corol one-petalled, funnel-form; stamens ten, alternately shorter. Female calyxless; corol five-petalled, spreading; styles three, cloven; capsules three-celled: seed one. Thirteen species; natives of the East or West Indies, or South America. The following are the chief.

1. J. gossipifolia. Leaves five-parted, with ovate, entire, ciliate lobes; petioles with glandular branched bristles. The stem arises about three or four feet, and then divides into various

branches, covered with a light-greyish bark. The corol is deep red, and consists of five petals. The berries that succeed to the flowers are husky and blackish, which burst when ripe, and discharge a large quantity of small dark-coloured seeds, peculiarly grateful to the ground-dove.

2. J. curcas. Leaves heart-shaped and angular: stem shrubby and knotty, rising ten or twelve feet: flowers green and umbellate, succeeded by nuts of a green husk, containing an almond-shaped kernel.

3. J. multifida. Leaves many-parted, smooth; stipules setaceous, many-cleft. Flowers red, umbellate and in bunches, resembling clusters of red coral: they afterwards open.

4. J. odoratissimum. Leaves alternate, rather obtuse, ternate and pinnate; branches round, segments of the calyx very short; stem woody; flowers yellow and odorous. A native of Madeira.

5. J. grandiflorum. Leaves opposite, pinnate; leaflets rather obtuse, three outer confluent; stem upright; buds horizontal; flowers reddish beneath. A native of India.

6. J. azoricum. Leaves opposite and ternate; leaflets ovate and somewhat heart-shaped, undulate; branches glabrous, round; segments of the corol equalling the tube: flowers in terminal branches, white; tube of the corol long. A native of the Azores.

7. J. hirsutum. Petioles and peduncles villous. A tall tree of India, with a dark purple bark, opposite leaves, and white flowers. See also Botany, Plate CXLI.

The first species flowers well in this country, but never produces fruit, and is easily propagated by laying down the branches, which will take root in one year, and may then be cut from the old plants, and transplanted where they are designed to remain. It may also be propagated by cuttings, which should be planted early in the autumn; and if the winter prove severe, the surface of the ground between them should be covered with tan, sea-coal ashes, or saw-dust, which will prevent the frost from penetrating deep into the ground; but these must be removed when the weather grows mild: these plants should be permitted to grow rude in the summer, nor should they be pruned or nailed till the middle or end of March, when the frost is over. Of this species there are two varieties, with variegated leaves; one with white, and the other with yellow stripes: the last is the most common. These are propagated by budding them on the plain jasmine; they should be planted in a warm situation, especially the white-striped, the branches of which, in very severe weather, should be covered with mats, or straw. The second species is propagated either by seeds, or laying down the branches; if by seeds, make a moderate hot-bed in the spring, into which plunge some small pots, filled with fresh, light earth; and in a day or two, when the earth in the pots is warm, put in the seeds: about four in each pot will be sufficient, covering them about an inch thick with the same light earth, and observing to refresh the pots with water as often as you perceive the earth dry. In about six or eight weeks after sowing, the plants will appear above ground; at which time it will be necessary to remove the pots into another fresh hot-bed of a moderate temperature, in order to bring the plants forward: they must be watered as often as necessary, and in the middle heat of the day, the glasses should be tilted very high, and shaded with mats, to prevent the plants from being scorched with heat. About the middle of May they should be hardened to the open air, by taking off the glasses when the weather is warm; but this should be done with caution, as the plants will be much injured if exposed to the sun in a very hot day at first: in June the pots should be taken out of the hot-bed, and placed in some sheltered situation, where they may remain till the beginning of October, at which time they must be carried into the green-house, where they should have as much free air as possible. During the winter they will require to be frequently, but gently watered; in March following they must be removed each into a separate pot, with the earth about their roots, and if they are plunged into a fresh moderate hot-bed, it will facilitate their rooting again, and be of great service to the plants; they must be inured to the open air, into which they should be moved about the middle of May, in a warm situation, and in winter they are to be housed, as before. If you would propagate this plant from layers, the shoots should be laid down in March, and if carefully attended to, they will be rooted by the succeeding spring, and fit to be transplanted; when they must be planted in pots, filled with light earth, and managed as directed for the seedling plants.

JATROPHA CURCAS. The systematic name of a plant whose seeds resemble the castor-oil seeds. See RICINUS MAJOR.

IATROLE'PTIC. *a.* (*iatroleptique*, Fr.) ιατρος and αλειφω.) Any medicine that cures by anointing.

JATS (the), once a powerful Hindu tribe, in Hindustan Proper, to whom all that now remains is the small territory of Bhartpour, 45 miles W. of Agra.

JAVA an island of the East Indies, which is situated S. of Borneo, and is 700 miles long, and 200 broad. It is a mountainous and woody country, in the middle, but it has a flat coast, and there are a great many bogs and morasses in it, which render the air unhealthful. It produces pepper, sugar, tobacco, rice, coffee, cocoa nuts, plantains, and other tropical fruits. The present inhabitants are a mixture of several Indian nations, whom the Dutch have brought from various islands in these seas, of which their states have possessed themselves. Many of them are Chinese fugitives, who have preferred leaving their country to submitting to the Tartar princes, who now reign in that kingdom. The Dutch are absolute masters of the greatest part of the island, particularly to the North coast; though there are still some princes beyond the mountains on the South

coast, who maintain their independency. In the year 1740 the Dutch pretended that the Chinese were plotting an insurrection, and therefore disarmed them. A short time after the Dutch gave orders for a general massacre among the Chinese; and upwards of 20,000 men, women, and children, were put to the sword, and their effects seized. Its principal town is Batavia.

To JA'VEL, or JABLE. *v. a.* To bemire; to soil over with dirt.

JA'VEL. *s.* (perhaps from the verb.) A wandering or dirty fellow (*More*).

JA'VELIN. *s.* (*javeline*, French.) A spear or half pike, which anciently was used either by foot or horse (*Addison*).

JAUM. See JAMB.

JAUNDICE, from the French *jaunisse* yellowness, of *jaune* yellow; a disease consisting in a suffusion of the bile over the whole surface of the body. See MEDICINE.

JAUNDICE, in farriery, is indicated by a yellowness of the eyes and mouth, dulness and lassitude. Sometimes the complaint is attended with costiveness, but more commonly with a purging. This disease does not often arise from an obstruction in the biliary ducts, as in the human subject, but generally from increased action of the liver, whereby an unusual quantity of bile is secreted. Inflammation of the liver is sometimes mistaken for jaundice, but may be distinguished from it by the fever with which it is always accompanied. When costiveness is one of the symptoms of jaundice, give an aperient ball every morning until moderate purging is produced; but if the bowels are already open, or in a state of purging, give a cardiac ball every morning. The horse's strength should be supported by infusion of malt, or water gruel.

The Ball No. 1. Calomel ½ dr. Aloes 1 dr. Castile soap 2 drs. Rhubarb 3 drs. To be made into a ball with syrup for 1 dose.

No. 2. Calomel and opium of each 1 dr. Columbo root powdered 3 dr. Powdered ginger ½ dr. Syrup enough to form the ball for one dose. (White's Compendium, p. 72.)

JA'UNDICED. *a.* (from *jaundice*.) Infected with the jaundice (*Pope*).

To JAUNT. *v. n.* (*jaunter*, Fr.) To wander here and there; to bustle about (*Shaksp.*).

JAUNT. *s.* (from the verb.) Ramble; flight; excursion (*Milton*).

JA'UNTINESS. *s.* (from *jaunty* or *janty*.) Airiness; flutter; genteelness (*Addison*).

JAW. *s.* (*joue*, a cheek, Fr.) 1. The bone of the mouth in which the teeth are fixed (*Walton. Grew*). 2. The mouth (*Rowe*).

JAWS. See MAXILLÆ.

JAW (Locked). See TETANUS.

JAWS (Knotted). In farriery; glandular tumours beneath the jaws of a horse, resembling knots or kernels, from whatever cause they may proceed.

JAWER, a city of Silesia, capital of a province of the same name. Lat. 50. 58 N. Lon. 16. 36 E.

JAY, in ornithology. See CORVUS.

JAZER, or JASER, in ancient geography, a Levitical city in the territory of the Amorrhites beyond Jordan, 10 miles to the west, or rather south-west, of Philadelphia, and 15 miles from Esebon; and therefore situated between Philadelphia and Heshbon.

IBERIA, the name given to Spain by the ancients, from the river Iberus. The people were called Iberes.

IBERIS. Candy tuft. In botany, a genus of the class tetradynamia, order siliculosa. Corol, irregular; the two outer petals larger; silicle compressed, emarginate. Eighteen species, all natives of the east, or of the south of Europe, except two I. amara, and I. nudiacaulis, which are common to the corn-fields of our own country. Of the exotics several are shrubs, but the greater number herbs. The flowers are generally in umbels or corymbs, with purple or white flowers. See Botany Pl. CXLI.

IBEX, in mastiology. See CAPRA.

IBIS, in ornithology. See TANTALUS.

IBISCUS, in botany. See HIBISCUS.

IBORG, a town of Germany, in the bishopric of Osnaburg. Lat 52. 14 N. Lon. 8. 20 E.

IBYCUS, a Greek lyric poet, of whose works there are only a few fragments remaining, flourished 550 B.C. It is said, that he was assassinated by robbers; and that, when dying, he called upon some cranes he saw flying to bear witness. Some time after, one of the murderers seeing some cranes, said to his companions, "There are the witnesses of Ibycus's death:" which being reported to the magistrates, the assassins were put to the torture, and, having confessed the fact, were hanged. Thence arose the proverb, Ibyci Grues.

ICADES, a monthly feast celebrated by the Epicureans, in honour of their master.

ICACE, in botany. See CHRYSOBALANUS.

ICE, water in the solid state. When water is exposed to a diminished temperature, it assumes the solid state, by shooting into crystals which cross each other in angles of 60 degrees. During this process of solidification, the temperature remains constant, being 32 degrees of the scale of Fahrenheit. See CALORIC; also FREEZING, and CONGELATION.

During congelation most of the gasiform fluids, which may have been contained in the water, are separated in the elastic form, and exhibit bubbles in the ice, unless the congelation may have been gradually effected from the bottom, or one of the sides; in which case the bubbles are driven out, and the ice is much clearer.

Ice is considerably lighter than water, namely, about one-eighth part; and this increase of dimensions is acquired with prodigious force, sufficient to burst the strongest iron vessels, and even pieces of artillery. It does not arise from the extrication of the gases. M. de Mairan, in a dissertation on Ice, attributes the increase of the bulk of the water under this form, chiefly to a different arrangement of its parts, the icy skin on water being composed of fila-

ments which are found to be joined constantly and regularly at an angle of 60°, and which, by this disposition, occupy a greater volume than if they were parallel. Besides, after ice is formed, he found it continue to expand by cold; a piece of ice, which was at first only a 14th part specifically lighter than water, on being exposed some days to the frost, became a 12th part lighter; and thus he accounts for the bursting of ice in ponds.

It appears from an experiment of Dr. Hooke, in 1663, that ice refracts the light less than water; whence he infers, that the lightness of ice, which causes it to swim in water, is not produced merely by the small bubbles, which are visible in it, but that it arises from the uniform constitution or general texture of the whole mass: a fact which was afterward confirmed by M. de la Hire. See Hooke's Exper. by Derham, p. 26, Acad. Per. 1693, Mem. p. 25.

M. Prévost observes, that congelation takes place much more suddenly than the opposite process of liquefaction; and that, of course, the same quantity of heat must be more rapidly extricated in freezing, than it is absorbed in thawing; that the heat thus extricated being disposed to fly off in all directions, and little of it being retained by the neighbouring bodies, more heat is lost than is gained by the alternation: so that where ice has once been formed, its production is in this manner redoubled. This circumstance must occur wherever it freezes, that is on shore, in latitudes above 35 degrees; and it appears, from 30 degrees to the pole, the land is somewhat colder than the sea, and the more as it is farther distant from it; and nearer the equator the land is warmer than the sea: but the process of congelation cannot, by any means, be the principal cause of the difference, and it is probable that the different capacity of earth and water for heat is materially concerned in it.

Since the atmosphere is very little heated by the passage of the sun's rays through it, it is naturally colder than the earth's surface; and for this reason, the most elevated tracts of land, which are the most prominent, and the most exposed to the effects of the atmospehre, are always colder than situations near the level of the sea.

A curious circumstance respecting the formation of ice in a cavern is noticed by Cadet in the Annales de Chimie, for 1803. About seven leagues from Besançon, near the village of Beaume, and half a league from the abbey of Grace Dieu, there is a natural grotto 146 feet below the surface of the plain. The entrance of it is 60 feet wide, and about 80 high. Within, its greatest breadth is 135 feet. The stone that forms the rock is calcareous carbonat, in part lamellated. This grotto is distinguished from all others by a very singular phænomenon: in summer, ice is constantly formed in it in large quantities, and this ice diminishes at the approach of winter. To account for this singularity, Cadet observes that the rock forming the roof of this cavern is lower than the neighbouring plains; and that the grotto itself is covered with bushy trees, from the leaves of which evaporation is constantly going on. In consequence of this evaporation, he contends, the ground is so far cooled in the summer as to occasion freezing in the cavern, in the same manner as water in porous jars is cooled in hot countries, by evaporation from the outsides, or as wine-coolers operate upon our tables; and on the other hand, when, by the falling of the leaves, evaporation is checked, the temperature of the cavern rises, and the quantity of ice is diminished by thaw. This natural ice-house, from which a supply is frequently procured when the neighbouring ice-houses are deficient, has been described by several authors; particularly by De Croismare in the French Encyclopédie, by Le Cat, and Ravier, by Madame Ganthier, and by several writers in the Memoirs of the Acad. of Sciences for 1712, those of Savans Etrangers for 1743, &c.

Ice is frequently applied by surgeons to resolve external inflammatory diseases.

Ice, denotes, 2. Concreted sugar. 3. *To break the* Ice. To make the first opening to any attempt (*Peacham*).

To Ice. *v. a.* (from the noun). 1. To cover with ice; to turn to ice. 2. To cover with concreted sugar.

Ice-boats, boats so constructed as to sail upon ice, and which are very common in Holland, particularly upon the Maese and the lake Y. They go with incredible swiftness, sometimes so quick as to affect the breath, and are found very useful in conveying goods and passengers over lakes and great rivers in that country. Boats of different sizes are placed in a transverse form upon a 2½ or 3 inch deal board: at the extremity of each end are fixed irons, which turn up in the form of skaits: upon this plank the boat rests, and the two ends seem as outriggers, to prevent oversetting; whence ropes are fastened that lead to the head of the mast in the nature of shrowds, and others passed through a block across the bowsprit: the rudder is made somewhat like a hatchet with the head placed downward, which being pressed down, cuts the ice, and serves all the purposes of a rudder in the water, by enabling the helmsman to steer, tack, &c.

Ice-house, a repository for the preservation of ice during the summer months.

The aspect of an ice-house ought to be towards the south-east, on account of the advantage of the morning sun in expelling the damp air, which is far more prejudicial to it than warmth. The best soil on which such a house can be erected is a chalk-hill, or declivity, as it will conduct the waste water, without the aid of any artificial drain; but where such land cannot be procured, a loose stony earth, or gravelly soil on a descent, is preferable to any other.

For the construction of an ice-house, a spot should be selected at a convenient distance from the dwelling-house. A cavity is then to be dug in the form of an inverted cone, the bottom being concave, so as to form a reservoir for the reception of waste water. Should the soil

render it necessary to construct a drain, it will be advisable to extend it to a considerable length, or, at least, so far as to open at the side of the hill or declivity, or into a well. An air-trap should likewise be formed in the drain, by sinking the latter so much lower in that opening as it is high, and by fixing a partition from the top, for the depth of an inch or two into the water of the drain, by which means the air will be completely excluded from the well. A sufficient number of brick-piers must now be formed in the sides of the ice-house, for the support of a cart-wheel, which should be laid with its convex side upwards, for the purpose of receiving the ice; and which ought to be covered with hurdles and straw, to afford a drain for the melted ice.

The sides and dome of the cone should be about nine inches thick, the former being constructed of brick-work, without mortar, and with the bricks placed at right angles to the face of the work. The vacant space behind ought to be filled up with gravel, or loose stones, in order that the water oozing through the sides may the more easily be conducted into the well. The doors of the ice-house should likewise be made to shut closely; and bundles of straw put before them, more effectually to exclude the air.

The ice to be put in should be collected during the frost, broken into small pieces, and rammed down hard in strata of not more than a foot, in order to make it one complete body; the care in putting it in, and well ramming it, tends much to its preservation. In a season when ice is not to be had in sufficient quantities snow may be substituted.

Professor Beckmann, in the third volume of his History of Inventions, has proved clearly that the ancients were well acquainted with what served the purpose of ice-houses.

"The art", says he, "of preserving snow for cooling liquors during the summer, in warm countries, was known in the earliest ages. This practice is mentioned by Solomon, (Proverbs xxv. 13), and proofs of it are so numerous in the works of the Greeks and the Romans, that it is unnecessary for me to quote them, especially as they have been collected by others. How the repositories for keeping it were constructed, we are not expressly told; but it is probable that the snow was preserved in pits or trenches.

"When Alexander the Great besieged the city of Petra he caused 30 trenches to be dug, and filled with snow, which was covered with oak branches; and which kept in that manner for a long time. Plutarch says, that a covering of chaff and coarse cloth is sufficient; and at present a like method is pursued in Portugal. Where the snow has been collected in a deep gulph, some grass or green sods, covered with dung from the sheep-pens, is thrown over it; and under these it is so well preserved, that the whole summer through it is sent the distance of 60 Spanish miles to Lisbon.

"When the ancients, therefore, wished to have cooling liquors, they either drank the melted snow, or put some of it in their wine, or they placed jars filled with wine in the snow, and suffered it to cool there as long as they thought proper. That ice was also preserved for the like purpose, is probable from the testimony of various authors; but it appears not to have been used so much in warm countries as in the northern. Even at present snow is employed in Italy, Spain, and Portugal; but in Persia ice. I have never any where found an account of Grecian or Roman ice-houses. By the writers on agriculture they are not mentioned."

ICE-PLANT. See MESEMBRYANTHEMUM.

ICEBERGS, large bodies of ice, filling the valleys between the high mountains, in northern latitudes. Among the most remarkable are those on the east coast of Spitzbergen. Their appearance is, in many respects, similar to that of the glaciers in Switzerland. They are the gradual creation of ages, and receive annually additional height by the falling of snows and of rain, which often instantly freezes, and more than repairs the loss occasioned by the influence of the melting sun.

ICELAND, an island of the North Sea, lying between 63. 15 and 67. 15 N. lat. and 10. and 25. W. lon. It is about 625 miles from east to west, and 310 from north to south. Iceland properly consists of a prodigious range of mountains running from east to west; on the declivities of which, and in the valleys lying between them, the inhabitants live. Several of these high mountains, which are always covered with ice and snow, are called Jocheler. Here are also some mountains that consist only of rocks and sand, which are consequently barren. But on other mountains, situated near the coast, there are levels, or plains covered with verdure, of several miles in extent, which produce fine grass. Though Iceland is, for the most part, a mountainous country, yet there are roads practicable for a horse in every part of the island. Carriages were formerly used here, but are now laid aside, as the trouble attending them was greater than the conveniency that could arise from them. Every year some hundreds of pack-horses come over the mountains from the north, to the trading places in the south parts of the island: these are loaded with butter, woollen manufactures, &c. which they barter for other commodities. Earthquakes are not unfrequent in Iceland, especially in the south parts. Springs which are naturally warm, and even hot springs, are frequently to be met with in Iceland, and likewise waters that have a mineral taste. About Mount Hecla are several small basons of warm water, which sometimes emit a copious steam, but at other times this vapour is not so visible. (See HUER). There are also evident signs that the mountains of Iceland contain iron, copper, and even silver ore. Near these are found two kinds of agate, which, when lighted, burn like candles; a species of bitumen, which is black, shining, and pretty hard; and another sort of black earth, which is harder,

and breaks into thin diaphanous laminæ; this is not inflammable, but vitrifies in the fire. Salt springs are not known here; however, salt has been found at the foot of the volcanoes or burning mountains. The common fuel of the country is turf, some of which has a very strong sulphureous smell; and even fish-bones are burnt in some part of this island. Very good grass not only grows in the valleys which border on the lakes and rivers, but also in the hollows betwixt the mountains, and sometimes even on the summits of the latter. The finest pastures are in the northern parts of the island, where the grass springs up very fast, and to a great height. The cattle are generally driven amongst the mountains to graze, where they find good pasture; but the grass that grows near the habitations of the Icelanders is reserved for winter fodder. The horses, as in all other northern countries, are small, but strong and full of mettle, and, excepting those that are broke for the saddle, lie in the open air all the year round. In winter they subsist on what fodder they can scrape from under the ice and snow. Great numbers of sheep are to be seen in Iceland, and in those parts where graziery is the chief occupation of the inhabitants: it is not uncommon for a man to be master of a flock of three, four, or five hundred. In the winter season they drive their flocks to shelter at night; and in very severe weather they keep them in the cotes also in the day-time. Nature seems to have provided a shelter for the sheep in those parts; there being large caves in the earth, into which these animals are sure to retire in severe weather. In the winter, when the snow is not very deep, and the weather inclinable to be fair and mild, the sheep are turned out to pick out what they can find under the snow. If these animals happen to be surprised at such times by a great snow, they immediately form themselves into a close compact body, by laying their heads together in the centre. In this posture they are quite covered with the snow, and sometimes are so benumbed with cold, as not to be able to help themselves, till their owner happens to find them, and clears their way out. This is often a work of some days; and many times the weight of the incumbent snow is so great, that the sheep are crushed to pieces by it before they can be relieved. In the extremity of hunger, when they pass some days in such a wretched situation, these animals have been known to eat one another's wool. Goats are few; some of the Iceland oxen and cows have no horns: and in the southern parts, they are fed with fish bones, and the water in which the fish was boiled. Here are no hogs; dogs are numerous, but very few cats are to be seen on this island. The birds of prey on this island are the eagle, hawk, raven, and falcon. Some of the last entirely white; others are partly of that colour; and others are brown. These are accounted the best falcons in Europe. The rivers, lakes, and bays, with the other parts of the sea, supply the Icelanders with prodigious quantities of various kinds of fish. The Icelanders are naturally of a robust and vigorous constitution, but are soon worn out by the continual fatigues and hardships they undergo at sea in their fisheries; so that very few of them reach to an advanced age. The usual food of the inhabitants of this island is fresh and dried fish, milk, oatmeal, and flesh; but they chiefly live on dried fish dressed with butter. It is remarkable, that they eat all their provisions without any salt. Their common drink is milk, which they drink by itself when sweet; but mix water with it when it turns sour. The exports from hence are chiefly dried fish, salted mutton; a good deal of beef, butter, and train-oil; a great quantity of tallow; coarse and fine jackets of Wadmal, woollen stockings and gloves, red wool, sheep-skins, fox-tails of several colours, feathers, and quills. The imports to Iceland are chiefly iron, horse's shoes, timber, meal, bread, brandy, wine, tobacco, coarse linen, a few silk stuffs, and domestic utensils. The Iceland dialect is the same with the old Norwegian language, though at present it is not quite pure and uncorrupted. The number of inhabitants in Iceland is, according to an authentic computation, about fifty thousand. There are no towns, properly called, on this island: however, the houses of the Iceland company at the two-and-twenty ports, or harbours, and of which there are three or four at each harbour, are dignified with the appellation of towns, though they are only trading places. Iceland, according to the general division, consists of four quarters, which derive their names from the four cardinal points towards which they lie: this division is caused by so many ridges of mountains which separate the quarters from each other. The north quarter constitutes the diocese of Hoolum, which contains 140 churches. The other three quarters are included in the diocese of Skaalholt, to which belong 163 churches.

ICENI, the ancient name of the people of Suffolk, Norfolk, Cambridgeshire, and Huntingdonshire, in England.

ICH DIEN, the motto of the prince of Wales's arms, signifying, in the High Dutch, I serve. It was first used by Edward the Black Prince, to shew his subjection to his father, King Edward III.

ICHNEUMON, in entomology, a species of the class insecta, order hymenoptera. Mouth with a straight, horny, membranaceous bifid jaw, the tip rounded and ciliate; mandibles curved, sharp; lip cylindrical, membranaceous at the tip and emarginate; feelers four, unequal, filiform, seated in the middle of the lip; antennas setaceous, of more than thirty articulations; sting exserted, inclosed in a cylindrical sheath composed of two valves, and not pungent.

The whole of this singular genus are parasitical, deriving their nourishment from other insects. The fly feeds on the nectar of flowers, and, when about to lay her eggs, perforates the body of some other insect or of its caterpillar, with its sting or instrument at the end of the abdomen, and there deposits them. These, after being transformed into larves, prey upon the

intestines of their foster-parent, till they are again metamorphosed into pupes. The larve is without feet, soft and cylindrical; pupe sometimes naked, sometimes foliculate.

It is a very numerous tribe; five hundred and ten distinct species having been actually traced and described as inhabitants of different parts of the globe; of which seventy are indigenous to our own country. They may be thus subdivided.

A. Scutel white or yellow; antennas annulate with white.
B. Scutel white or yellow; antennas entirely black.
C. Scutel, the colour of the thorax: antennas annulate.
D. Scutel, the colour of the thorax: antennas black. This is by far the most numerous section.
E. Antennas yellow.
F. Minute: antennas filiform: abdomen sessile, ovate.

Moths and butterflies of all kinds in their larve state are very generally selected as niduses: and in these the ichneumon larves commit enormous depredations. The aphtha and curculio are often also made choice of; and we frequently meet with millions of husks or spoils of plant lice, the insects having been totally destroyed by the ravage of internal ichneumons.

The following, which usually inhabits Pavia, has not been often described, and we shall therefore select it, as a general example.

I. seductor. Black; scutel yellow; tip and petiole of the abdomen and crenate band on the fore-part, yellow; legs mostly yellow. Forms a nest of cemented clay in chimneys and windows, divided into cylindrical cells, in each of which is contained a cylindrical, brown, lucid follicle, and in this the larve, with frequently the carcase of a spider in which the insect had deposited her eggs.

ICHNEUMON, in mastiology. See VIVERRA.

ICHNOGRAPHY, in perspective, the view of any thing cut off by a plane, parallel to the horizon, just at the base of it. The word is derived from the Greek ιχνος, footstep, and γραφω, I write, as being a description of the footsteps or traces of a work.

ICHNOGRAPHY, in architecture, the ground-plot. See DESIGN.

ICHOGLANS, the grand signior's pages, serving in the seraglio.

ICHOR. (*ichor*, ιχωρ.) A thin, aqueous, and acrid discharge.

I'CHOROUS. *a.* (from *ichor.*) Serous; sanious; thin; undigested (*Harvey*).

I'CTERUS. (*icterus*, ικτερος, named from its likeness to the plumage of the golden thrush, of which Pliny relates, that if a jaundiced person looks on one, the bird dies and the patient recovers.) The jaundice. A genus of diseases in the class cachexiæ and order impetigines of Cullen; characterized by yellowness of the skin and eyes; feces white; and urine of a high colour. Species: 1. Icterus calculosus, acute pain in the epigastric region, increasing after eating; gall-stones pass by stool. 2. Icterus spasmodicus, without pain, after spasmodic diseases and passions of the mind. 3. Icterus mucosus, without either pain, gall-stones, or spasm, and relieved by the discharge of tough phlegm by stool. 4. Icterus hepaticus, from an induration of the liver. 5. Icterus gravidarum, from pregnancy, and disappearing after delivery. 6. Icterus infantum, of infants.

ICHTHYOCOLLA. (*ichthyocolla*, ιχθυοκολλα: from ιχθυς, a fish, and κολλα, glue.) Colla piscium. Isinglass. Fish-glue. A substance, partly gelatinous, and partly lymphatic, which is prepared by rolling up the air-bladder of the Accipenser strurio of Linnéus, and several other fishes, and drying it in the air, after it has been twisted into the form of a short cord, as we receive it. It affords a viscid jelly by ebullition in water, which is used in medicine as an emollient in disorders of the throat and intestines.

An inferior kind of isinglass is obtained from the mucilaginous parts of almost all the northern fishes, porpusses, sea-wolves, sea-cows, whales, sharks, and cuttle-fish. The isinglass thus obtained, is used in clarifying wines and other fluids, in fixing the matter in the composition of crayons, in stiffening silks and gauzes, in the manufacture of artificial pearls, and forming English sticking plaster. See GELATIN.

ICHTHY'OLITHUS. In mineralogy, a genus of the class petrefactions: consisting of the body or parts of a fish changed into a fossile substance. Four species:

1. I. niger. In a black slaty stone. Found in the island of Sheppy, and various parts of Wales; in the mountains of Switzerland, Silesia, Germany, &c. impregnated with bitumen, pyritaceous matter, or oxyd of copper; the fishes resembling the eel, sword-fish, cod, flat-fish, perch, roach, dace, mackrel, mullet, carp, tench, pike-fish, ray, &c.

2. I. albidus. In a pale slaty stone. Found in various parts of England, on mount Libanus in Palestine, in the ecclesiastical territories of Italy, in Switzerland, Bavaria, &c.—the fishes are rarely of the sea kind, as mackrel, gurnard, &c. usually of fresh water, as eels, perch, tench, dace, roach, salmon, &c.: they are seldom found whole, but in parts only, as the head, gill-covers, and other bones, fins, tails, tendrils or scales; the slaty or shistose stone often approaching towards marble, and sometimes penetrated with bitumen.

3. I. bufonites. Toad-stone. The grinders of the sea-wolf. Found in various parts of England, particularly in Oxfordshire, generally roundish and hollowed like a cup, from the size of a small pea, to nearly an inch in diameter; colour black, grey or brown, sometimes finely variegated, always polished.

4. I. glossopetra. The teeth of the shark. Found, in six or seven varieties, in different parts of England and Scotland, in Malta, Italy, France, Germany, of different sizes, solitary, or many together, loose or attached to other

ossils, fibrous internally, shining outwardly, of a glaucous, bay, dark-brown, rarely sea-green colour.

ICHTHYOLOGY (from ιχθυς, a fish, and λογος, a treatise or doctrine): the natural history of fishes; constituting the fourth division of the Linnéan system of zoology.

Consistently with the plan we have pursued in the divisions of Entomology and Helminthology, we shall give a general outline of this division in the present article, instead of deferring it to the main subject of Zoology, which we shall rather devote to a general abstract of the different ramifications of the science, than a detailed examination of every individual branch.

I. *On the Study and general Arrangement of Fsihes.*—Considering the extent of this department of natural history there is no one in which mankind have in all ages betrayed more ignorance; an ignorance, however, not to be wondered at, when we reflect at the same time that the animals of which it treats exist in an element so different from our own, and in depths so recondite that there is much reason to suppose that great numbers of entire genera have never to this hour been forced by accident or dragged by human skill to dry land so as to render them subjects of scientific examination.

In rude and savage life fishes, indeed, constitute a very great part, often the greatest part, of the common means of subsistence: yet in such situations the fishes resorted to are but few in kind, and only such as are most easily taken in the adjoining lakes or rivers.

Even after nations have attained to some degree of knowledge and civilization, many ages elapse before they push their inquiries far into the subject of ichthyology, or acquire any considerable acquaintance with the inhabitants of the ocean. In the unfathomed depths of that turbulent and extensive element, probably millions reside, which are secluded from human observation; and, even of the few which the industry of man has, at last, drawn from their hidden abode, we hardly know any thing, but the external figure, and the names. Their food, their longevity, their method of propagating their kind, and the whole of their manners and economy, remain still among those numberless secrets of nature, which human ingenuity has not hitherto been able to explore. Hence, the natural history of fishes has seldom been found interesting, because it is destitute of that information, which it is the province of history to convey. It is more imperfect and obscure than that of quadrupeds and birds, in proportion as the element, in which fishes reside, is more extensive and inaccessible.

Before the Christian era, few writers had turned their attention to this difficult branch of natural history. Aristotle, Theophrastus, Strabo, and Terentius Varro, had made their observations on such as were then known; but they had scarcely any idea of treating the subject in a scientific manner. After that period, Appian, Ovid, and Columella, described the fishes of the Euxine and Adriatic seas, as far as they had access to examine them. Pliny was the last, and by far the most copious writer upon this subject, among the ancients. He is, indeed, too diffuse; while his credulity and love of the marvellous considerably weaken the authority of his narrative. An hundred and twenty-four species were all that the assiduity of the ancient naturalists had discovered.

During the decline and fall of the Roman empire, attention to ichthyology, as well as to every other part of literature, was entirely laid aside; and the pernicious effects of the Gothic invasions did not allow it to be resumed, till the year 1524, when Paulus Jovias, an Italian writer, gave an account of those fishes that were known to the ancient Romans. After him, various local historians appeared. These were followed by Belonius and Rondeletius, who described the fishes of the Mediterranean; while Swinfield, Marcgrave, and Catesby, gave, successively, an account of the fishes of Silesia, Brasil, and the Carolinas.

While ichthyology was thus enriched by historians of particular districts, there were other naturalists, who engaged in this science in a more general and systematic manner. The Honourable Francis Willoughby published, in 1686, a history of fishes, which is still deemed one of the most valuable upon this subject. To Willoughby succeeded Ray, and these were followed by Artedi and Linnéus, who have carried the science to a greater degree of perfection than it had hitherto attained.

If however we take into account the vast number of fishes, of which the very names have not yet found a place in the systems of naturalists, we must necessarily conclude, that this part of science ~~is still in~~ its infancy. Some very skilful ichthyologists assert, that there are to be found in the different collections of fishes about London, six hundred kinds not enumerated by Linnéus; and hence we may easily admit, that there are yet, in the unfathomable depths of the ocean, far greater numbers that have not come into the possession of the curious.

It is remarkable, that there is no system of ichthyology in the English language. Goldsmith's plan did not admit of any thing more than a general sketch ofthis subject. Accordingly, he has not described a twentieth part of those that are already found in the systems of Artedi and Linnéus. Pennant has, indeed, given a correct and elegant history of the British fishes; but these make only a small part of the inhabitants of the ocean.

By the labours, however, of these different naturalists, nearly eighty distinct genera of fishes, many of them comprising seventy or eighty different species, have been enumerated, and described; and, in appearance at least, considerable progress has been made in explaining their history: but, unfortunately, the names and external figure of many of these are all that we know. Their food, migrations, manner of life, and every quality that can render their history interesting, still remain to be explored.

Aristotle, that great father of naturalists, first suggested the excellent arrangement of fishes into cetaceous, cartilaginous, and spinous orders; which, as far as it goes, seems impossible to be altered for the better. Rondeletius, the first naturalist, who, after the revival of learning, turned his attention to this subject, attempted to lay aside the Aristotelian division, and to substitute, in its room, another, founded upon the habitation of fishes, or those places where they reside. He, accordingly, classed them into fishes of the sea, rivers and lakes. Since, however, many fishes reside indiscriminately in all these situations, this method was abandoned by Willoughby and Ray, who resumed the arrangement of Aristotle; to which Linnéus added some farther subdivisions, which rendered it far more complete.

Soon after this restoration, however, of the

Aristotelian classification by Linnéus, it was discovered that the internal structure of the cetaceous division conformed rather to the mammal or quadruped order than to that of other fishes, and that, in many parts, the external figure bore an equal coincidence. It was observed that cetaceous fishes are destitute of gills: that they breathe by means of lungs, and, on that account, are obliged to rise frequently to the surface of the water for respiration: that they also resemble land animals in having warm blood; in being provided with external organs of generation; and in their manner of copulating and bringing forth their young, which they suckle, and protect with parental attachment: that they have the power of uttering sounds, such as of bellowing and making similar noises; a faculty denied to the other inhabitants of the deep. On this account, in the later editions of his zoological system, Linnéus separated these from the class of fishes, and removed them to that of MAMMALS, under which term, or rather under that of MASTIOLOGY, the Greek being employed instead of the English or Latin, as in the case before us of ichthyology instead of pisces or fishes, the reader will find them referred to.

Subsequently to this separation, it was also pretty generally conceived, in consequence of the anatomical observations of Dr. Garden of South Carolina, who, at the request of Linnéus, particularly examined the organs of the genus diodon, that this order of fishes also was furnished with lungs, but at the same time with gills. This idea however has been shewn by later physiologists to be not strictly correct: the supposed lungs being in reality only a peculiar modification of gills; and hence these have since been restored from the class of amphibials to which Linnéus, in consequence, transferred them, to that of fishes, and constitute one of the two last orders.

We have now therefore six orders under the class pisces or fishes: four derived from the Aristotelian division spinous, or those whose muscles are supported by spines or bony matter, as the apodal, the thoracic, the jugular, and the abdominal; the arrangement being founded on the absence of the ventral fin, as in the first order, or on its situation in regard to the pectoral fins, as in the others: and two derived from Aristotle's cartilaginous fishes, the branchiostegous, or those whose gills are destitute of bony rays; and the chondropterygious, or those with cartilaginous gills.

The apodal fishes are such as want the ventral fins altogether, as the swordfish and eel. In the jugular, the ventral fins are placed before the pectoral, as is exemplified in the codfish and blenny. The thoracic are distinguished by having the ventral fins placed beneath the pectoral, as is illustrated by the mackrel, and father-lasher. The abdominal fishes are known by having the ventral fins placed behind the pectoral fins, near to the abdomen, as in the salmon and pike. This distribution of fishes, according to the situation of their fins, is exceedingly judicious and natural. It first occurred to Linnéus, when examining a collection of prepared subjects, in the presence of Dr. Solander, who witnessed the extasy of this indefatigable naturalist on making this discovery. The branchiostegous order includes fishes whose gills are destitute of bony rays; and the chondropterygious those which are destitute of bone altogether, and possessed of cartilage instead.

Thus arranged, the general character of fishes is as follows. They are animals of the waters; swift in their motion, and voracious in their appetites. They breathe by means of gills, which are generally united by a bony arch; swim by means of radiate fins, and are mostly covered over with cartilaginous scales. Besides the parts they have in common with other animals, they are furnished with a nictitant membrane, and most of them with an air-bladder; by the contraction or dilatation of which they can raise or sink themselves in their element at pleasure. They are destitute of eye-lids, external ears, neck, arms, and legs. They hear through the medium of water and not of air; move themselves by means of their fins; are propelled forward by the caudal or tail-fin; directed to either side by the dorsal and anal fins; lifted upwards by the pectoral, and rest themselves on the ventral fins; they are sometimes defended with spines. Their food is mucus, insects, worms, dead bodies, smaller fishes or sea-plants. The generic character is taken from the shape of the body, covering, structure, figure, and parts of the head, but principally from the branchiostegous membrane. The specific character is taken from the cirri, jaws, fins, spines, lateral line, digitated appendages, tail, and colour. The age of fishes is known by numbering the concentric circles in a transverse section of the back-bone, or the concentric circles on the scales.

II. *Of the external Parts and Motion, the Brain and Senses of Fishes.*—The external form of most fishes, tends greatly to the ease and celerity of their motion. It is sharp at either end, and swelling towards the middle; and is modelled by nature after that shape, which we endeavour to imitate in those vessels that are intended for the greatest despatch. Every human contrivance, however, falls far short of the rapidity of the natives of the sea. All the larger fishes can easily overtake the best constructed vessel while in full sail; and play around it, without any apparent labour.

The principal instrument of this great velocity in fishes, is the tail, aided by the strength and flexibility of the back-bone. The other fins are too small, slender, and flexible, compared with the weight of the animal, to impel it through the water with such vast rapidity and force. Their principal use is to direct and moderate the movement, communicated by the impulse of the tail. A fish, when deprived of these, and put into a pond, darts upwards, downwards, and laterally, with all its wonted velocity, but without being able to direct its course. The ventral and dorsal fins serve the purpose of keeping fishes in an erect and perpendicular position; and, perhaps, the first contributes to raise or sink them in the water. The pectoral fins regulate and assist progressive motion. When swimming rapidly forward, fishes can, by extending these, stop their motion, and produce morah; and when swimming in a straight direction, they can, by folding either, while the other continues to ply, direct their motion to that side. The size of these fins is, in general, proportioned to that of the head of the fish to which they belong; and it is probably one use of them, to prevent the fish from being overbalanced by the weight of its head, and precipitated to the bottom. In some fishes, the pectoral fins serve the same purpose as the wings of birds; for, by their means, they are enabled to rise from their watery element, and to fly for a considerable space, till their fins are so dried by the air, that, in spite of every exertion, they again sink into the water.

A fish completely equipped for swimming has

seven fins, two pairs, and three single ones; and of the latter, two are above, and one below: but, since those which have the greatest number of fins are not the swiftest, it has been concluded, that the tail is the principal cause of the swiftness of a fish's motion. When in pursuit of its prey, or avoiding an enemy, all the smaller fins are laid close to its body; then, by the impulse of the tail alone, it skims through the water with the incredible velocity of a dart or an arrow. The muscles, by which the tail is moved, are, by far, the thickest and strongest of the whole body; and to give direction to the great impetus which they communicate to the fish, seems to be the chief purpose of all the smaller fins.

The motion of fishes is supposed to be assisted by the air-bladder, which, by contraction or dilatation, serves to raise or sink them in the watery element at pleasure; and, as that element is of very different degrees of weight, according to its depth, fishes, by thus varying their specific gravity, can poise themselves in any part of it. That this is the use of the air-bladder, some naturalists have ascertained by experiment: an incision made into this organ, by which the air is allowed to escape, obliges fishes, after some efforts, to sink to the bottom of the water. This opinion seems to receive confirmation from the manners of those kinds in which it is wanting. All flounders and ground-fishes are destitute of a swimming-bladder; and, by consequence, lie constantly at the bottom; while the cartilaginous orders, which often support themselves at the surface, without the aid of this instrument, are supplied with lung-like gills, which serve the same purpose, by admitting the air, in much greater quantity, into the cavity of their bodies. The air-bag has a strong, muscular coat, and it is by virtue of this that it contracts itself at pleasure. In some fishes the air-bag communicates by distinct processes with the œsophagus or fauces, and in others with the stomach.

Fishes thus fitted for motion in their element, by their internal structure, as well as by their outward shape, and the situation of their fins, seem as well furnished with the means of happiness as either quadrupeds or birds. Like these they are provided with an external covering, to defend them from injuries in the turbulent fluid they inhabit. That slimy and glutinous substance, which is secreted from the pores of all fishes, not only defends their bodies from various accidents, but is happily contrived to lubricate their bodies and give facility to their progress through the water. The greater part of them are also provided with a strong covering of scales, which still more powerfully protects them from injury; and, beneath this, they are supplied with an oily matter, which preserves the body in warmth and vigour.

The brain in fishes is formed pretty much in the same way as in fowls, only that the posterior lobes bear a greater proportion to the anterior. The organ of smelling is large, and the animals have a power of contracting and dilating the entry to it as they have occasion, It seems to be mostly by their acute smell that they discover their food, for their tongue seems not to have been designed for a very nice sensation, being of a pretty firm cartilaginous substance; and common experience evinces that their sight is not of so much use to them as their smell in searching for nourishment. If you throw a fresh worm into the water, a fish will distinguish it at a considerable distance: and that this is not done by the eye is plain from observing that after the same worm has been a considerable time in the water, and lost its smell, no fishes will approach it: but if you take out the bait and make several little incisions into it, so as to let out more of the odoriferous effluvia, it will have the same effect as before. Now it is certain that did these animals discover this bait with their eyes they would approach it equally in both cases. In consequence of their smell being the principal means they have of discovering their food, we may frequently observe them allowing themselves to be carried down with the stream, that they may re-ascend leisurely against the current of the water: thus the odoriferous particles swimming in that medium, being applied more forcibly to their organs of smell, produce a stronger sensation.

Although it was formerly doubted whether fishes possessed the sense of hearing, there can be little doubt of it now, since it is discovered that they have a complete organ of hearing as well as other animals; and likewise that the water in which they live is proved to be a good medium. Fishes, particularly those of the skate-kind, have a bag at some distance behind the eyes, which contains a fluid and a soft cretaceous substance, which supplies the place of the vestibule and cochlea: there is a nerve distributed upon it, similar to the portio mollis in man: they have semicircular canals which are filled with a fluid, and communicate with the bag: they have likewise a meatus externus which leads to the internal ear. The cod-fish, and others of the same shape, have an organ of hearing somewhat similar to this, but instead of a soft substance contained in a bag, they have a hard cretaceous stone. The fact of their hearing has been well ascertained by Mr. John Hunter; and in Germany, where carp and other kinds are tamed and kept in ponds, they are regularly convened to their meals by the call of a bell.

The sight of fishes is probably the most perfect of all their senses, and yet it is far inferior to that of most other animals. They have, properly speaking, no eye-lids: their sight is protected in the water by a nictating membrane, which is a continuation of the same transparent skin that covers the rest of the head. The crystalline humour, which in most other animals is flat, is in them convex, and round like a ball. In consequence of this, these animals must be near-sighted, even in water, which however, like a concave glass, corrects, in some degree, this defect of the organ of vision. We have no evidence of fishes seeing at a considerable distance; and the case with many of them, that are deceived by the different kinds of bait prepared in imitation of their food, gives room to suspect, that objects are not very distinctly perceived by them, even when near.

From this short account of the external senses of fishes, it must appear, that their faculties, in point of perfection, fall greatly below those of most other kinds of animals. In every thing resembling intelligence, their inferiority is equally striking. They are incapable of attachment, or of acquiring any new habits by domestication and intercourse with man. Some faint traces, indeed, of memory they discover, if it be true, that they regularly return to the place where they have been fed: but even this small share of recollection can hardly be allowed them without hesitation; for they may be assembled there, merely by seeing one of their number pick up the remains of

the food which they had formerly left. It forms no exception to the general conclusion, that all their powers and faculties are of a subordinate kind, suited to that humble and passive existence which nature has assigned them. To preserve existence, and to continue it to posterity, fill up the whole circle of their pursuits and enjoyments, to which they are impelled rather by necessity than choice. While they are instinctively excited to fruition, their senses are incapable of making any distinctions; and they are hurried forward in pursuit of whatever they can swallow, conquer, or enjoy.

III. *Of the internal Organs of Fishes, and the Functions of Respiration and Digestion.*—Almost all the tribes of fishes are provided with teeth of some kind or other: yet the generality of them are deficient in strong teeth, or such as are calculated for breaking and grinding the food, which usually consists of small fishes or other animals that need no trituration in the mouth, but spontaneously dissolve into a liquid chyle, their teeth rather serving to grasp their prey and hinder it from escaping. For the same purpose the internal cartilaginous basis of the bronchi and the two round bodies situated in the posterior part of the jaws have a great number of tenter-hooks fixed into them in such a manner as to permit any thing easily to get down, but to be prevented from returning: the superfluous water which is necessarily received along with the food passing between the interstices of the bronchi and the flap which covers them. The compression of the water on the bronchi is of considerable use to the creature, as will presently appear. The œsophagus or gullet is very short, and scarce to be distinguished from the stomach, since the food is retained almost equally in both. The stomach is of an oblong figure, and from the prey contained in it, which commonly preserves its natural form though reduced to a gelatinous softness, it may be concluded that digestion is performed in it entirely by the dissolvent parts of some peculiar menstruum, and not by any trituration.

The intestines are in general very short, making only three turns, the last of which terminates in a common outlet or vent, placed towards the middle of the lower part of the body. The appendicular or secondary intestines (cæcer), are in their onion also very numerous, composing a large groupe of worm-like processes; all ultimately in two larger canals opening into the first intestine, into which they discharge their peculiar fluid.

The liver in fishes is remarkably large, and commonly lies almost wholly on the left side; it contains a great portion of oil or fat.

The spleen is placed near the back-bone, and at a place where it is subject to an alternate contraction and dilatation from the pressure of the air-bag, which is situated in its neighbourhood.

The ova in females are disposed into two large oblong bodies, one on each side of the abdomen; and the milt or soft roe in the male appears in a similar form in the same part. The swimming or air bladder is an oblong membraneous bag, in which is contained a large quantity of elastic air. This organ lies close to the back-bone, near a red glandular substance, and has a strong muscular coat, by virtue of which it can occasionally contract itself, and by condensing the contained air, cause the body to be specifically heavier than water, so as to descend; or by being again dilated, enable it to ascend, by being specifically lighter; by which means the animal is enabled to swim in any height of water at pleasure. Some fishes, as the flounder, and the whole tribe of flat fish, are observed to be unprovided with this curious organ, and are in consequence obliged to remain always at the bottom of the waters they inhabit. From the anterior part of the bag pass out two processes or appendices, which, according to the anatomists of the French Academy, terminate in the fauces. In some fishes the air-bag communicates with the œsophagus, and in others with the stomach.

The peritoneum, or membrane investing the contents of the abdomen, is thin, and of a blackish colour.

The heart is of a triangular form, with the base downwards, and the apex upwards; it consists of one auricle, and one ventricle. The aorta sends out numberless branches to the bronchia, or gills; on which it is distributed into subdivisions, so small as to escape the eye, unless assisted by a glass. The blood is red, and the red particles are not round, as in the mammalia; but oval, as in the amphibia. The gills, or branchiæ, are seated beneath two large slits or openings on each side of the head, and are analogous to the lungs in other animals. Their general form is semicircular, and they commonly consist of four double rows of fringed vencular fibrils attached to four bony arches. The gills are perpetually subject to alternate motion and pressure from the water; they are guarded externally by the gill covers, or opercula, constituting a pair of strong flaps on each side, and which are furnished with a lateral membrane dilatable at pleasure, by a certain number of bony radia or arches, in such a manner as to enable the animal either to open or close the gill-covers. The blood, after being thrown by the heart into the ramifications of the gills, is collected again by a vast number of small veins, somewhat in the same manner as in the mammals; but instead of returning to the heart again, these vessels unite and form a descending aorta, without the intervention of an auricle and ventricle. The absorbent system in fishes is thus elaborately described by Dr. Monro, who gives the haddock as a general example: On the middle of the belly, immediately below the outer skin, a lymphatic vessel runs upwards from the vent, and receives branches from the sides of the belly, and the fin below the vent: near the head, this lymphatic passes between the two pectoral fins, and having got above them receives their lymphatics; it then goes under the juncture of the two bones which form the thorax, where it opens into a net-work of very large lymphatics, which lie close to the pericardium, and almost surrounds the heart: this net-work, besides that part of it behind the heart, has a large lymphatic on each side, which receives others from the kidney, runs upon the bone of the thorax backwards, and when it has got as far as the middle of that bone, sends off a large branch from its inside to join the thoracic duct; after detaching this branch, it is joined by the lymphatics of the thoracic fins, and soon after by a lymphatic which runs upon the side of the fish. It is formed of branches which give it a beautiful penniform appearance: besides these branches, there is another set lying deeper, which accompanies the ribs: after the large lymphatic has been joined by the above-mentioned vessels, it receives others from the gills, orbit, nose, and mouth. A little below the orbit another net-work appears, consisting in part of the vessels above described, and of the thoracic duct. This net-work is very complete,

some of its vessels lying on each side the muscles of the gills; and from its internal part a trunk is sent out, which terminates in the jugular vein.

The lacteals run on each side of the mesenteric arteries, anastomosing often across those vessels; the receptacle into which they enter is very large in proportion to them, and consists at its lower part of two branches, one of which lies between the duodenum and stomach, and runs a little way upon the pancreas, receiving the lymphatics of the liver, pancreas, lower part of the stomach, and the lacteals from the greatest part of the small intestines. The other branch of the receptacle receives the lymphatics from the rest of the alimentary canal. The receptacle formed by these two branches lies on the right side of the upper part of the stomach, and is joined by some lymphatics in that part, and also by some from the sound and gall-bladder, which in this fish adheres to the receptacle. The thoracic duct takes its rise from the receptacle, and lies on the right side of the œsophagus, receiving lymphatics from that part, and running up about half an inch, divides into two ducts; one of which passes over the œsophagus to the left side, and the other goes straight upon the right side, passing by the upper part of the kidney, from which it receives some small branches, and soon afterwards is joined by a branch from the large lymphatic which lies above the bone of the thorax, as formerly mentioned: near this part it also sends off a branch to join the duct of the opposite side, and then a little higher is joined by those large lymphatics from the upper part of the gills and from the fauces.

The thoracic duct, after being joined by these vessels, communicates with the net-work near the orbit, where its lymph is mixed with that of the lymphatics from the posterior part of the gills, and from the superior fins, belly, &c.; and then from this net-work a vessel goes into the jugular vein just below the orbit. This last vessel, which may be called the termination of the whole system, is very small in proportion to the net-work from which it rises: and indeed the lymphatics of the part are so large as to exceed by far the size of the sanguiferous vessels. The thoracic duct from the left side, having passed under the œsophagus from the right, runs on the inside of the vena cava of the left side, and joins the large lymphatics which lie on the left side of the pericardium, and a part of those which lie behind the heart, and afterwards makes, together with the lymphatics from the gills, upper fins and sides of the fish, a network from which a vessel passes into the jugular vein of this side: in a word, the lymphatics of the left side agree exactly with those of the right. Another part of the system is more deeply seated, lying between the roots of the spinal processes of the back bone. This part consists of a large trunk that begins from the lower part of the fish, and as it ascends receives branches from the dorsal fins and adjacent parts of the body: it goes up near the head, and sends a branch to each thoracic duct near its origin: though we are acquainted with the organs of respiration in fishes, we are very ignorant of the actual process of this function. It has been generally conceived by physiologists that fishes obtain the oxygen necessary for life by a decomposition of the element in which they live: yet that this, even if any part of the process, does not constitute the whole, we are certain from the fact that they cannot breathe in water which has not a free communication with the external air. Some have been shut up in a narrow-mouthed vessel, and have lived there for several years; but the air is no sooner excluded, by stopping up the opening, than the animals are suffocated in the course of a few minutes. When this experiment is repeated with the vessel filled half with water, and half with air, after covering the mouth, as the air below began to be exhausted, the fishes are seen struggling to rise above one another, and inhale a small supply at the surface of the water; and the same consequence will follow, if you fasten down the opercula of the gills with a string, so that respiration cannot be performed. This probably is the cause why so many fishes are destroyed in rivers by severe frost: since, by the congelation of the whole surface of the water, the external air is excluded, the animals below necessarily perish. Aelian mentions a method of taking fihes in the river Ister, founded upon this observation. In the rigour of winter, the fishermen broke small holes through the ice. The suffocated animals instantly crowded to the aperture, in order to procure a supply of air; and so eager were they to obtain it, that rather than abandon the attempt, they suffered themselves to be caught with the hand.

Next to the necessity of breathing air, that of devouring food seems to be the most constant and urgent in the nature of fishes, as well as of other animals. Among fishes this appetite, both in strength and avidity, seems to surpass those limits which nature has prescribed to herself in the other classes of the animal kingdom. Every aquatic animal that has life, falls a victim to the indiscriminate voracity of fishes of some kind or other. The smaller tribes devour insects, worms, or the spawn of the rest of the tenants of the waters; while they, in their turn, are pursued by millions larger and more rapacious than themselves. A few of them feed upon mud, the aquatic plants, or grains of corn; but by far the greater number subsist upon animal food alone. Char kept in a pond, if scantily supplied, frequently devour their own young. Others that are larger, go in quest of a larger prey; it matters not of what kind, whether of another species, or of their own. Those with the most capacious mouths pursue almost every thing that has life, and often meet each other in fierce opposition, when the fish which has the widest throat comes off with victory, and devours its antagonist.

Thus the rapacious fishes are different from the predatory kinds of terrestrial animals; being neither few in number, nor solitary in their habits. Their rapacity is not confined to a few species, one region of the sea, or individual efforts. Almost the whole class is continually irritated by the cravings of an appetite, the strength of which excites them to encounter every danger, and which, by its excess, often destroys that life which it was intended to prolong. Innumerable shoals of one species pursue those of another through vast tracts of the ocean, from the vicinity of the pole, down to the equator. It is thus that the cod pursues the whiting, which flies before it, from the banks of Newfoundland, to the southern coasts of Spain. Thus too the cachalot drives whole armies of herrings from the regions of the north, devouring, at every instant, thousands in the rear. Hence, the life of every fish, from the smallest to the greatest, is but a continued scene of rapine; and every quarter of the immense ocean presents one uniform picture of hostility, violence, and invasion.

In this unceasing conflict, occasioned by the

voracity of the different kinds of fishes, the smaller tribes must have long since fallen victims to the avidity of the larger, had not nature skilfully proportioned the means of their escape, their numbers, and their productive powers, to the extent and variety of the dangers to which they are continually exposed. To supply the constant waste, occasioned by their destruction in the unequal combat, they are not only more numerous and prolific than the larger kinds; but by a happy instinct are directed to seek for food and protection near the shore, where, from the shallowness of the water, their destroyers are unable to pursue them. These smaller tribes yielding to the strong impulse of hunger, become plunderers in their turn, and revenge the injuries committed on their kind, by destroying the spawn of the larger fishes, which they find floating upon the surface of the water. Even here, however, they often meet with that violence which their own avidity merits; for the oyster, the sallop, and the muscle, lie in ambush at the bottom, with their shells open; and, whatever little fish inadvertently comes into contact, they instantly close their shells upon it, and, at their leisure, devour it in the concealed mansions of a prison, from which there is no possibility of escape.

In what manner digestion is carried on to such an amazing extent and rapidity, in the stomachs of fishes, no inquiries of naturalists have yet been able to ascertain. If we were to judge from their substance or heat, we would be led to conclude, that the digestive powers of these animals are feeble and imperfect; whereas, they appear so far to exceed every thing that can be effected, either by trituration, the operation of heat, or of a dissolving fluid, that Dr. Hunter, after various experiments, is of opinion, that none of these causes is equal to the effect; and that we are as ignorant of their mode of digestion as of their mode of respiration

The powers of assimilation in fishes seem to increase with the quantity of food with which they are supplied. A pike sparingly fed can be habituated to subsist on very little nourishment; if fully supplied, it acquires the power of devouring a hundred roaches in three days. The digestive faculty of fishes is as extraordinary, as their appetite is voracious. The cod and sturgeon will not only swallow but dissolve crabs, muscles, lobsters, and every kind of shell fish, whose coverings are much harder than the coats of their stomachs.

Several exceptions to the extraordinary voracity of fishes are produced by naturalists, which, if fully examined, will, perhaps, appear more apparent than real. Some are said to subsist on pure water alone; an assertion which is supposed to be proved by numberless instances of their subsisting, for several months, in ponds constructed of hewn stone, where they had been supplied with no food. It is alleged too, that those, which are carried from a distance to the markets of London and Paris in perforated vessels, must subsist upon water alone.

The element of water, however, is seldom found pure and unmixed. The very epithets of salt, bitter and sweet, imply a composition and mixture, perceptible even to the taste. The particles of the earth upon which it runs necessarily enter into it, and vitiate its purity. These substances, together with myriads of animalcules with which it teems, may supply, for a while, a scanty subsistence, and support the life of the most voracious animals. Independently of which, a decomposition of the water alone may probably furnish them with some portion of recruit.

In the mean time, it must be allowed, that fishes, though for ever hungry and prowling, can endure the want of food for a long time. In them, habits seem to be formed by the circumstances in which they are placed. Want produces abstinence; from abundance they learn voracity. A pike, one of the most glutonous of fishes, will live, and even thrive, in a pond where there is none but itself: and the gold and silver fishes, which we confine in glass vases, subsist, frequently for years, without any visible support but water. Rondeletius mentions one that was kept at his house, in this manner, for three years, which grew to such a size, that the vase could scarcely contain it, nor could it be brought out at the same passage by which it was introduced into the vessel. It would appear, therefore, that, in certain situations, fishes are as remarkable for abstinence, as, in others, they are distinguished for voracity; and that nature, in compassion to the want which they must often suffer, has indulged them with a power of accommodating their appetite to scarcity of food, as well as to abundance; and of obtaining it from water alone in a state of decomposition, when they have no other means of subsistence.

IV. *Of the Generation, Fecundity, &c. of Fishes.*—The grand division of fishes into the cetaceous, cartilaginous, and spinous, was formed by Aristotle, according to the three different modes of their generation. Among those of the first order, fecundation is accomplished within the body of the female, by means of a penis intrans, as in terrestrial animals. They are all viviparous; that is, the female, after having been fecundified by the male, and after a certain period of gestation, produces a living and perfect animal.

The cartilaginous are in many genera possessed of a penis intrans, and, except some species of the sturgeon, the whole are viviparous; the fecundation being performed within the body of the female, who conceives two or more large eggs, distinctly containing a red and white substance, like those of birds. In these eggs the fetus is formed; and, by the white of them, it is fed, while it is hatched within the body of the mother, without being excluded in the egg state, as is the case in birds. In this state, the eggs have been found in the belly of a dogfish, as well as other species of squalus, with the young completely formed, and of a very considerable size. The number of these eggs lodged at one time in the uterus is various, according to the species to which the animal belongs. Redi observed in the belly of a dogfish six that were arrived at their full size, besides many others, in which the fetus was scarcely formed; Rondeletius saw, in the cornua uteri of a torpedo, six eggs on one side, and eight upon the other.

The mode of generation that obtains among the viviparous or spinous fishes is, from their situation and manner of life, involved in great obscurity. It is generally supposed, that their eggs are not fecundified till after their exclusion from the matrix of the female. They seem, indeed, amidst their evolutions in the deep, to copulate; but, as the male is furnished with no external organs of generation, his cohabitation with the female is only to emit his impregnating milt upon the eggs, as

they fall from her body. For this purpose, it is said, he pursues them along the stream, carefully impregnating them, one after another.

These facts, however, are controverted by Linnéus, who maintains, that no fecundation can take place, except within the body of the female, although the generation of frogs and lizards has always been regarded as an example of the contrary. In support of his hypothesis, he asserts that he observed, at spawning season, every male pike surrounded by several females; and that, as soon as the milt was ejected by him, it was immediately swallowed by the females; a procedure which he had occasion to notice in several other kinds of fish.

The experiments that have lately been made at Berlin, by Jacobi, seem totally to overthrow this doctrine of Linnéus. He has found, that of both salmon and trout the roes, artificially extracted from the body of the female, are capable of being fecundified by an admixture with the milt of the male. Hence it is probable, that, though both the male and the female concur in the great work of impregnation, yet the act is performed without the body of the latter; and that the spawner ejects her eggs, while the milter sprinkles them with sperm.

Fishes, in general, are male and female; the former possessing the milt, and the latter the roe. Some individuals of the cod and sturgeon are said, indeed, to contain both. The spawn of the greater number of fishes is deposited in the sand or gravel; and, in that state, it is probable, that the roe and milt are mixed together. Summer is the most common time for the spawning of fishes; because, at that season, the water is tepified by the beams of the sun, and therefore better fitted for quickening the eggs into life. It is probably for this reason that the herrings frequent the shores of Britain, at the spawning season; there not being, in the higher northern latitudes, a sufficient quantity of heat to hatch their eggs. When they have deposited their burdens, they return to their former stations, and leave their infant progeny to shift for themselves.

The spawn of different fishes continues in the state of eggs, sometimes for a longer, and sometimes a shorter period. In general, however, this period is proportioned to the size of the animal. In the salmon kind, the young animal continues in the form of an egg from the month of December till April; the young carp continues not in that state for above three weeks; and the gold fish from China is produced in a still shorter period.

When excluded from the egg, the young fishes all, at first, escape by their minuteness and agility. They perform all their motions with much greater celerity and ease, than grown and bulky fishes; and can make their way into shallow water, where they cannot easily be pursued. But, with all these advantages, not one, perhaps, of a thousand, survives the dangers of its youth. There is no instance, among the spinous fishes, of any thing resembling parental affection: they all abandon their eggs to be hatched by the heat of the season; and, if they ever return to the spot where their young have begun the career of life, the male and female that gave them birth, forgetting all parental relation, become enemies as formidable as the most rapacious plunderers of the deep.

Though fishes fall in millions by the rapacity of one another, yet they have other enemies than the animals of their own kind. Many of the quadrupeds frequent shores, rivers, and lakes, where fishes form almost their only food; and we have already had occasion to remark, that a great proportion of the fowls reside constantly on the sea, where they either feed upon spawn, or become the merciless invaders of small fishes. Thousands, too, of the human race wander, in a savage state, around lakes and rivers, whence they derive a considerable portion of their sustenance. And among those nations whom arts and agriculture have rendered less dependent on this precarious support, superstition has come in the place of want, and given a new edge to their avidity for this species of food. From the invasions, therefore, of terrestrial animals, and from their own mutual rapacity, the annual consumption of fishes is immense; but the munificent Author of Nature has made a kind provision for his creatures, by the amazing fertility which he has conferred on this class of beings.

The fecundity of fishes in general far surpasses that of any other animals; in some it exceeds belief, for there are individuals among this class of the animal kingdom capable of producing, in one year, a greater number of their species than all the inhabitants of Great Britain. Nine millions of ova have been found in the spawn of a single cod; one million, three hundred, and fifty-seven thousand, four hundred, have been taken from the belly of a flounder: the mackerel, carp, tench, and a variety of other species, are said to possess a degree of fertility but little inferior.

Such an astonishing progeny, were it allowed to arrive at maturity, and to add the whole of its number to the rest of the family, would soon overstock nature; and even the ocean itself would not be able to contain, much less to provide for, the half of its inhabitants. Of the ova however spawned by these different fishes, not one perhaps in an hundred ever becomes a full-grown animal: they are devoured by the lesser fry that frequent the shores, by aquatic birds near the margin, and by the large fishes in deep waters. Such as still survive are sufficient for supplying the ocean with inhabitants; and of these, notwithstanding their own rapacity, and that of aquatic fowls and terrestrial animals, enough is left to relieve the wants of a great portion of the human race. Thus, two important purposes are answered in the economy of nature by the extraordinary fecundity of fishes: it preserves the species amidst numberless enemies, and serves to furnish the rest with a sustenance adapted to their nature.

Among terrestrial animals there are various degrees of fertility, according to their chance of destruction, from the want of courage, bulk, or strength: the largest are always least productive, and the smaller are more prolific, in proportion as the dangers increase, to which they are exposed. The same observation may be extended to the inhabitants of the ocean: among these, as the cetaceous fish resemble quadrupeds in their habits and conformation, so they are distinguished by a similar degree of sterility. All the whales, and even the cartilaginous fishes, are not, perhaps, superior to terrestrial animals in their powers of production. Among the hungry and heedless inhabitants of the sea, they are distinguished by finer organs and higher sensations. Their size and courage place them, in a great measure, beyond the reach of danger; they nurse their young with tenderness and assiduity, and they protect them from injury with an obstinate intrepidity little inferior to

that of the lion or the eagle. Hence the number of their young is few, proportioned to the dangers to which they are exposed; amidst that security which they enjoy, and the ease with which they can repel the hostility of the inimical tribes, they run but little hazard of being destroyed by their rapacity. But these observations rather belong to the division of mastiology than of ichthyology.

V. *Of the Growth, Longevity, and Dietical Use of Fishes.*—As the dangers to which the progeny of all the spinous fishes, while in the form of ova, and in their nascent state, are innumerable, and surrounding them on every side, nature has happily ordered, that they should remain but a short time in that defenceless condition. The period at which the different species arrive at their appointed size, is not exactly ascertained; but the generality of naturalists agree in reckoning it extremely short. Aristotle, and Pliny who copied him, seem both to have committed a mistake, when they assigned only two years for the life of the tunny, a fish which approaches to the size of a whale. This species had various different names assigned it, till it arrived at its fifth year, when it received the appellation of a whale; a circumstance from which we must conclude, that the ancients in general entertained a very different idea of its longevity. Of a similar error many of the moderns are guilty in asserting, that the common salmon arrives at its full growth in a year. Our most experienced fishermen distinguish these also by different names, till they arrive at their sixth year, when they are supposed to have reached their full size: those of the first year they call smelts; of the second, sprods; of the third, morts; of the fourth, fork-tails; of the fifth, half-fish; and of the sixth, salmons. It is probable, however, notwithstanding the immense size at which many of them arrive, that fishes, in general, are of a quick growth, and that the period of their adolescence is short, in proportion to that of their lives. There is another peculiarity attending the growth of fishes; and that is, that for the most part the largest kinds inhabit the colder regions of the ocean, adjoining the poles. The reverse of this is the case with terrestrial animals, who always diminish in size as they recede from the heat; and by far the largest of them, the elephant, the camel, and rhinoceros, are only found in the warm or intratropical latitudes. It is probable, indeed, that the whales might prefer the more temperate regions of the ocean, and might even acquire a large size there, were they not compelled to avoid them by the frequent disturbance given by ships, and to seek that tranquillity, of which they are fond, in the unhospitable climes of the arctic and antarctic.

Hitherto, we have been examining fishes with regard to their form and faculties, and have found them inferior to terrestrial animals in their organization, and in the number of their enjoyments. We are now to contemplate them in a more favourable point of view, and that is, in the extraordinary period of time during which they possess the humble existence which nature has assigned them. Their longevity is far superior to that of other animals. We have already seen what ample provision is made for supplying them with food, by multiplying the inhabitants of the sea: they are, therefore, in little danger of perishing from want; and there is reason to believe that they are, in a great measure, exempt from diseases.

Most of the disorders incident to mankind arise from the changes and alterations incident to the atmosphere; but fishes reside in an element but little subject to change; theirs is an uniform existence; their movements are without effort, and their life without labour. Their bones also, which are united by cartilages, admit of indefinite extension; and the different sizes of animals of the same kind among fishes is very various. They still keep growing; their bodies, instead of suffering the rigidity of age, which is the cause of natural decay in land animals, still continue increasing with fresh supplies; and as the body grows, the conduits of life furnish their stores in greater abundance. How long a fish, that seems to have scarce any bounds put to its growth, continues to live, is not ascertained.

Some species of the German carp have been known to live an hundred years; those species, however, with which we are best acquainted, seem not to enjoy so great a degree of longevity. The salmon, we have remarked, takes only six years to reach its full size; if we allow four or five times that space for the period of its life, it will not exceed thirty years.

Different methods have been devised for ascertaining the age of fishes, some of which will perhaps pretty accurately determine this matter. The ingenious M. Hiddostroam, a Swede, has attempted to compute their ages by the number of concentric circles observed in a transverse section of the vertebræ of the back; and it has been found, that each circle, like that in the section of a tree, corresponds to a year of the animal's life. In confirmation of this fact, experiments have been made on different individuals of various sizes, but of the same age, whose concentric circles have always been of an equal number; whereas a young fish differs from an older one of the same species, by having a smaller number of these circles. By this method of computation, several fishes have been found from fifteen to twenty years, but none have given indications of a greater age.

Another method of computing the age of fishes, practised by M. de Buffon, is by numbering the concentric circles upon their scales; but as this requires a more minute examination, it is, of consequence, liable to greater uncertainty. On examining the scale of a fish through a microscope, it exhibits a number of circles, one within another, resembling those in the vertebræ of the back, and, like them, every circle represents a year of the fish's life. A scale of a carp, thus examined, announced the animal to be no less than an hundred years; a longevity credible, because confirmed by the testimony of several different authors, some of whom have asserted, that this fish lives twice that period.

The dietical uses of fishes are to us the most important article of their history, a part that is happily free from that uncertainty and darkness in which many other circumstances relating to their manners and economy are still involved. All fishes whatever, and particularly those without the tropics, are capable of being converted into wholesome food. Every European fish, while in season, is nutritive; the various methods of preparing and dressing them are detailed by the authors to whom that province belongs. Such disquisitions constitute the history of an art, but they are not the objects of science.

Fishes, in general, when out of season, are unwholesome, and even pernicious; and this is more especially the case with the oily kinds; such as the herring, the mackerel, the eel and the salmon.

Some of the fishes that frequent the shores of the West-Indian islands are said to be poisonous: that they are naturally so, however, may be justly questioned; though there can be no doubt of their becoming pernicious under certain circumstances. If they feed upon copper-banks, their food may contain so great a quantity of the poison combined with that metal, as may render their flesh noxious; and the same consequence will ensue if they devour the seeds of some poisonous plants that grow in these parts of the globe.

The improvement of the arts tends greatly to extend the dominion of man over the inferior animals; the art of navigation, in particular, may be said to have completed his conquest of the ocean, and brought a vast accession both to the fund of his subsistence and enjoyments, by the capture of so many animals whom nature seemed to have placed beyond the reach of his power. A fleet of fishing-vessels, manned by a few thousand European sailors, is capable of taking a greater number of fishes in a season, than perhaps could be done by all the savages on the continent of America. But the superstitious regulations of the Romish church have tended more than any other circumstance to enhance the value, and increase the quantity of this species of food. To supply the imaginary abstinence of the devout or superstitious, large demands are annually made upon the sea; and to make up for the deficiency of this precarious supply, ponds have been dug, and fishes, like land animals, rendered domestic.

In the construction of these ponds, it may be proper to observe, that, if intended for breeding, they ought to be of various depths, from six feet to six inches; few fishes however will spawn in water of any considerable depth. Such pieces of water ought also to be partly filled with aquatic plants; because these afford shelter and nourishment to different kinds of insects, that contribute to feed the fishes: for a similar reason, fish-ponds ought to be surrounded with trees, that the insects frequenting them may afford an additional supply for their sustenance. In arranging the fishes in these receptacles, attention ought to be paid to the different species that are introduced into the same pond. Carp and tench agree well together; but they frequently do not thrive when mixed with any other species. The perch is almost the only fish that can be safely entrusted in a sheet of water frequented by the pike.

In populous countries, like China or Holland, where every article of food is in request, and every spot of ground is turned to account, great attention is paid to the structure and management of fish-ponds: there experience has taught men to ascertain the quantity of every kind of fish, which any given space of water can support. Ninety brace of carp, and forty of tench, may be supported in an acre of water; a greater number would languish and die. In transporting fishes from rivers into ponds, it has been found that the young thrive much better after the operation than the old; for at that period of life they possess a power of more easily accommodating themselves to any change in their situation.

In some parts of Germany, where the domestication of fishes is practised, the ponds are constructed in a suit, one adjoining another; and, by means of a communication between them, the superintendants can empty the water of one pond, together with its fishes, into another. After this is accomplished, the empty one is frequently plowed, and sown with barley: when the grain is in the ear, the water with its inhabitants are again admitted to feed upon the grain, and are thus more expeditiously fattened than by any other management. In all fish-ponds, the milters are the preferable kind, for they become much fatter than the spawners.

Fishes of different species, as well as terrestrial animals, are found capable of producing an offspring; but their cross-breeding is a very obscure article of their history. Few species have hitherto been domesticated, and on these but a very small number of well-attested experiments are known. A cross breed is said to be obtained between the carp and the bream, and between the carp and tench: that between the carp and tench was produced by mixing the milt of the former with the spawn of the latter; the offspring, which was examined by Mr. Pennant, bore a greater resemblance to the male than the female parent.

It is remarkable, that so few species of this class of the animal kingdom have been translated from their primitive haunts, and made subservient to man by domestication. Only three kinds have been transported from foreign parts into Britain; the carp, the tench, and the goldfish. Double that number are domesticated with success upon the continent; but even this, in all probability, is but few to what might easily be rendered subservient to the same purpose, by the industry of man. There can at least be entertained no doubt that those domesticated upon the continent would thrive equally in Britain.

The cyprinus orfus is found indigenous in many of the rivers in England, where it is called the rudd. It is reckoned a superior fish to the carp in many respects, yet it has never been domesticated in its native country, though reared with great advantage in the fish-ponds of Sweden. The cobytus fossilis is a fish unknown in this country; but is domesticated, with profit, in the ponds at Stockholm, and might, with equal propriety, be translated into those of Scotland. In the same manner, the cobytus barbatula, which was introduced into Sweden by Frederick I. might be made an inhabitant of our artificial ponds. The salmo tymalis of Linnéus, known among ourselves by the name of grayling, is one of the best fishes both for sport and the table, and might easily be transported from the streams of Derbyshire, its native residence. Both eels and char might be rendered useful pond-fish, as neither are too delicate for transportation; and, from experiments already made, the certainty of their thriving is fully established.

If the translation of fishes have not been often attempted, it certainly is not because they are incapable of sustaining various degrees of heat, and of living in different climates. The necessity of procuring a supply of food; of seeking a safe retreat for propagating their species, or a temperature of that element in which they live, suited to their constitutions, compels fishes, as remarkably as terrestrial animals, to make extensive migrations from one part of the sea to another. With regard, however, to this curious subject, we have but few facts upon which we can depend.

Fishes, like land animals, are either solitary or gregarious: of the former kind, trout, salmon, pike, &c. the migrations are probably in quest of a proper place to deposit their spawn. Salmons, for this purpose, leave the sea, and mount the rivers in the beginning of winter, where they dig in the gravel, deposite their burden, and again return. Trouts likewise ascend near the source of

the rivulets at the season, when they enter the smaller branches that run into the main stream, for the purpose of spawning. It is then they are often seen in small rivulets upon high grounds, in water so shallow as scarcely to cover their bodies.

Of the gregarious fishes that frequent fresh water, we know but little concerning their migrations. It is probable, that the perch and the minnow are stationary, and that they retire only to the margin of the river to deposit their spawn. The fishes most remarkably gregarious are the inhabitants of the sea; such as the cod, ling, herring, pilchard, and sparling. The migrations of the herring are well known. In the months of June and July, it issues in vast shoals from the unexplored regions of the northern ocean; surrounds the British isles, and enters the bays and arms of the sea. These fishes are known to take up their residence in some particular loch or creek for eight or ten years, and then to resort to another for a similar period. The tythe, the calfish, the cod, and whiting, have all their seasons of migration. The last, in particular, are probably forced upon those immense journeys from the coasts of America to those of Spain and Africa, to avoid the pursuit of the cod, and other rapacious invaders.

From these observations, it would appear, that fishes of the same species are capable of living in very different quarters of the globe, and of enduring various degrees of heat and cold; a circumstance which opens a vast field for the enterprise and ingenuity of man in transporting them, and rendering them subservient to the purposes of domestication. It is impossible to determine to what length this operation may be carried, or to ascertain how great an accession might thus be made to the sustenance of the human race.

ICHTHYOPHAGI. Fish-eaters. A name given to a people, or rather to several different people, who lived wholly on fishes. The word is Greek, compounded of ιχθυς, *piscis*, fish, and φαγειν, *edere*, to eat. The Ichthyophagi spoken of by Ptolemy are placed by Sanson in the provinces of Nanquin and Xantong.

ICHTHYOSIS. (*ichthyosis*, ιχθυωσις; from ιχθυα, the scale of a fish, from the resemblance of the scales to those of a fish.) A genus of diseases of the second order of Dr. Willan's diseases of the skin. The characteristic of ichthyosis is a permanently harsh, dry, scaly, and in some cases, almost horny texture of the integuments of the body, unconnected with internal disorder. Psoriasis and lepra differ from this affection, in being but partially diffused, and in having deciduous scales. The arrangement and distribution of the scales in ichthyosis are peculiar. Above and below the olecranon on the arm, says Dr. Willan, and in a similar situation with respect to the patella on the thigh and leg, they are small, rounded, prominent, or papillary, and of a black colour; some of the scaly papillæ have a short narrow neck, and broad irregular tops. On some part of the extremities, and on the trunk of the body, the scales are flat and large, often placed like tiling, or in the same order as scales on the back of a fish; but in a few cases they have appeared separate, being intersected by whitish furrows. There is usually in this complaint a dryness and roughness of the soles of the feet; sometimes a thickened and brittle state of the skin in the palms of the hands, with large painful fissures, and on the face an appearance of the scurf rather than of scales. The inner part of the wrists, the hams, the inside of the elbow, the furrow along the spine, the inner and upper part of the thigh, are perhaps the only portions of the skin always exempt from the scaliness. Patients affected with ichthyosis are occasionally much harassed with inflamed pustules, or with large painful boils on different parts of the body: it is also remarkable, that they never seem to have the least perspiration or moisture of the skin. This disease did not, in any case presented to Dr. Willan, appear to have been transmitted hereditarily; nor was more than one child from the same parents affected with it. Dr. Willan never met with an instance of the horny rigidity of the integuments, ichthyosis cornea, impeding the motion of the muscles or joints. It is however mentioned by authors as affecting the lips, prepuce, toes, fingers, &c. and sometimes as extended over nearly the whole body.

I'CICLE. *s.* (from *ice.*) A shoot of ice hanging down (*Woodward*).

I'CINESS. *s.* (from *icy.*) The state of generating ice.

ICKENILD-STREET, is that old Roman highway, denominated from the Icenians, which extended from Yarmouth in Norfolk, the east part of the kingdom of the Iceni, to Barley in Hertfordshire, giving name in the way to several villages, as Ickworth, Ickling-ham, and Ickleton in that kingdom.

ICKWORTH, a town in Suffolk, with a market on Fridays. Lat. 52.22 N. Lon. 1.0 E.

ICOLMKILL, formerly Iona, a noted little island, one of the Hebrides, near the S. W. point of the Isle of Mull. It is about three miles long and one broad. On this island, which is very fertile, are a mean village, and the ruins of an august monastery and cathedral, said to have been founded by St. Columba, where there are three royal chapels, or rather cemeteries, in which several ancient kings of Scotland, Ireland, and Norway are buried. In former times, this island was the place where the archives of Scotland, and many valuable and ancient MSS. were kept. Many of these, it is said, were carried to the Scotch college at Douay in France.

I'CON. *s.* (εικων.) A picture or representation (*Hakewill*).

ICONIUM, at present Cogni, formerly the capital city of Lycaonia in Asia Minor. St. Paul coming to Iconium (Acts xiii. 51. xiv. 1. &c.) in the year of Christ 45, converted many Jews and Gentiles there. It is believed that, in his first journey to this city, he converted St. Thecla, so celebrated in the writings of the ancient fathers.

ICONOCLASTES, or ICONOCLASTÆ, breakers of images: a name which the church of Rome gives to all who reject the use of images in religious matters. The word is Greek, formed from εικων *imago*, and κλαζειν *rumpere*, to break. In this sense, not only the reformed but some of the eastern churches are called Ico-

noclastes, and esteemed by them heretics, as opposing the worship of the images of God and the saints, and breaking their figures and representations in churches.

ICONO'LOGY. *s.* (*iconologie*, Fr. εικων and λεγω.) The doctrine of picture or representation.

ICOSAHEDRON, in geometry, a regular solid, consisting of twenty triangular pyramids, whose vertexes meet in the centre of a sphere, supposed to circumscribe it; and, therefore, have their height and bases equal; wherefore the solidity of one of those pyramids multiplied by twenty, the number of bases, gives the solid content of the icosahedron. See BODY.

To form or make the Icosahedron.—Describe upon a card paper, or some other such like substance, 20 equilateral triangles, as in the figure at the article REGULAR BODY. Cut it out by the extreme edges, and cut all the other lines half through, then fold the sides up by these edges half cut through, and the solid will be formed.

The linear edge or side of the icosahedron being A, then will the surface be $5\,A^2\sqrt{3} = 8{\cdot}6602540A^2$, and the solidity $=$

$$\tfrac{5}{6}A^3\sqrt{\frac{7+3\sqrt{5}}{2}} = 2{\cdot}1816950A^3.$$

ICOSA'NDRIA. (εικοσι twenty, and ανηρ a husband.) In botany, the name of the twelfth class in the Linnéan system: comprehending those plants which have hermaphrodite flowers, with twenty or more stamens, growing on the inside of the calyx, not on the receptacle. The situation, and not the number of the stamens is here to be attended to. The calyx also is monophyllous and concave in this class: and the claws of the petals are fixed into the inside of the calyx. To confound this class with polyandria is abominable.

ICTE'RICAL. *a.* (*icterus*, Latin.) 1. Afflicted with the jaundice (*Floyer*). 2. Good against the jaundice.

ICY. *a.* (from *ice*.) 1. Full of ice; covered with ice; made of ice; cold; frosty (*Pope*). 2. Cold; free from passion (*Shakspeare*). 3. Frigid; backward (*Shakspeare*).

I'D. Contracted for *I would*.

IDA, in ancient geography, a mountain situated in the heart of Crete where broadest; the highest of all in the island; round, and in compass 60 stadia (Strabo); the nursing place of Jupiter, and where his tomb was visited in Varro's time. Another Ida, a mountain of Mysia, or rather a chain of mountains (Homer, Virgil), extending from Zeleia on the south of the territory of Cyzicus to Lectum the utmost promontory of Troas. The abundance of its waters became the source of many rivers, and particularly of the Simois, Scamander, Æsopus, Granicus, &c.

IDALIUM, in ancient geography, a promontory on the E. side of Cyprus, now Capo di Griego. It was sacred to Venus; whence the epithet Idalia given her by the poets.

IDANHA-A-VELLA, a town of Portugal, in Beira. Lat. 39. 39 N. Lon. 6. 14 W.

IDEA (ιδεα), the image or resemblance of a thing, which, though not seen, is conceived by the mind.

The word is Greek; Cicero renders it into Latin by *exemplar*, and *exemplum*; and Plato himself, in some places, employs as a synonym παραδειγμα. Cicero, in his Topics, also expresses it by *forma* and *species*.

By the term idea, as defined by Mr. Locke, is meant whatever is the object of the understanding when a man thinks, or whatever it is which the mind can be employed about in thinking.

In order to trace the manner by which we acquire these ideas, let us suppose the mind to be, as we say, *white paper*, void of all characters, without any ideas: how comes it to be furnished? whence has it all the materials of reason and knowledge? From experience and observation. This, when employed about external sensible objects, we may call sensation: by this we have the ideas of bitter, sweet, yellow, hard, &c. which are commonly called sensible qualities, because conveyed into the mind by the senses. The same experience, when employed about the internal operations of the mind, perceived and reflected on by us, we may call reflection: hence we have the ideas of perception, thinking, doubting, willing, reasoning, &c.

These two, viz. external material things as the objects of sensation, and the operations of our own minds as the objects of reflection, are the only originals from whence all our ideas take their beginnings: the understanding seems not to have the least glimmering of ideas which it doth not receive from one of these two sources. These, when we have taken a full survey of them, and their several modes and compositions, we shall find to contain our whole stock of ideas: and that we have nothing in our minds which did not come in one of these two ways.

It is evident, that children come by degrees to be furnished with ideas from the objects they are conversant with: they are so surrounded with bodies that perpetually and diversely affect them, that some ideas will (whether they will or no) be imprinted on their minds. Light and colours, sounds and tangible qualities, do continually solicit their proper senses, and force an entrance into the mind. It is late, commonly, before children come to have ideas of the operations of their minds; and some men have not any very clear or perfect ideas of the greatest part of them all their lives: because, though they pass there continually, yet, like floating visions, they make not deep impressions enough to leave in the mind clear and lasting ideas, till the understanding turns inward upon itself, and reflects on its own operation, and makes them the objects of its own contemplation.

When a man first perceives, then he may be said to have ideas; having ideas, and perception, signifying the same thing.

Ideas, according to Mr. Locke, are divided into simple and complex

Ideas (Simple), include all those which come into the mind by sensation; and though the qualities of bodies that affect our senses are in the things themselves so mixed and united, that there is no separation between them, yet the ideas they produce in the mind are simple and unmixed. Again, some of these ideas we acquire purely by means of one sense; as the ideas of colours, only by the eye; of sounds, by the ear; of heat, by the touch, &c. Other ideas we gain by several senses, as of space, extension, figure, rest, motion, &c. for these have their effect, both on the sight and the touch. Others, again, are had from reflection only; such as those of perception and willing. There are other simple ideas, again, formed, in the mind, both by sensation and reflection, jointly; as those of pleasure, pain, power, existence, unity, succession, &c. And some of these kinds of ideas are all, or at least the most considerable, of those simple ideas which the mind hath, and out of which is made all its other knowledge.

The better to comprehend the nature of simple ideas, it will be convenient to distinguish between them, as they are ideas of perceptions in our minds, and as they are modifications of the bodies that cause such perceptions in us, that we may not think, as is usually done, that they are exactly the images and resemblances of something inherent in the object; for most of those of sensation are in the mind no more the likeness of any thing existing without us, than the names that stand for them are the likeness of the ideas.

But here the qualities of bodies which produce those ideas in our minds are to be distinguished into primary and secondary. Primary qualities are such as are utterly inseparable from the body, in what state soever it be, and such as our senses constantly find in every particle of matter; which are solidity, extension, figure, mobility, and the like. Secondary qualities are, such as are, in reality, nothing in the objects themselves, but only powers to produce various sensations in us, by means of their primary qualities; that is, by the figure, bulk, texture, &c. of their particles, as colours, sounds, taste, &c.

Now the ideas of primary qualities are, in some sense, resemblances of them, and their patterns do really exist in the bodies themselves, but the ideas produced in us by those secondary qualities have no resemblance of them at all. There is nothing like our ideas existing in the bodies themselves, that occasion them: they are, in the bodies we denominate from them, only a power to produce those sensations in us; and what is sweet, warm, blue, &c. in the idea, is no more than the bulk, figure, and motion, of the particles of the bodies themselves, which we call so.

The mind has several faculties of managing these simple ideas, which are worthy of notice: as, 1. That of discerning justly, and distinguishing rightly, between one and another; in which consists the accuracy of judgment.

2. That of comparing them one with another, in respect of extent, degree, time, place, or any other circumstances of relation or dependence, one on another.

3. That of compounding, or putting together, the simple ideas received by sensation and reflection, in order to make complex ones.

4, Children, by repeated sensations, having got some ideas fixed in their memories, by degrees learn the use of signs; and when they can speak articulately, they make use of words to signify their ideas to others.

Hence, the use of words being, to stand as outward marks of our internal ideas, and those ideas being taken from particular things, if every particular idea that we take in should have a particular name affixed to it, names would become endless. To prevent this inconvenience, the mind has another faculty, whereby it can make the particular ideas received from such objects become general; which is done by considering them as they are in the mind, such appearances, separate from all other existences, and circumstances of existence, as time, place, and other concomitant ideas; and this is called abstraction, whereby ideas taken from particular things become general representatives of all of that kind, and their names, general names, applicable to whatever exists conformable to such abstract ideas. Thus, the same colour being observed to-day in chalk, or snow, which we observed yesterday, in paper, or milk, we consider that appearance alone to make it a representative of all of the same kind, and give it the name of whiteness; by which sound we always signify the same quality, wheresoever to be met with, or imagined.

From the powers of combining, comparing, and separating, or abstracting simple ideas, acquired by sensation and reflection, all our complex ideas are formed; and, as before, in the perception of ideas, the understanding was passive, so here it is active, exerting the power it hath in the several acts and faculties above mentioned, in order to frame compound ideas.

Ideas (Complex), though their number be infinite, and their variety endless, yet may all be reduced to these three heads; viz. modes, substances, and relations. Modes are such complex ideas, as, however compounded, are not supposed to exist by themselves, but are considered as dependences on, or affections of, substances: such are the ideas signified by the words triangle, gratitude, murder, &c.

These are of two kinds: 1. Such as are only variations, or different combinations, of the same simple idea, without the mixture of any other; as a dozen, a score, &c. which may be called simple modes. 2. There are others, compounded of simple ideas, of several sorts put together, to make one complex one; as beauty, theft, &c.

Substances have their ideas from such combinations of simple ideas, as are taken to represent distinct particular things, subsisting by themselves; in which the supposed or confused idea of substance, such as it is, is always the first and chief.

Relations are a kind of complex ideas, arising

from the consideration or comparison of one idea with another. Of these, some only depend on the equality or excess of the same simple idea in several subjects; and these may be called proportional relations; such as equal, more, bigger, sweeter. Another occasion of comparing things together is owing to the circumstances of their origin and beginning; which not being afterwards to be altered, make the relations depending thereon as lasting as the subjects to which they belong. Thus it is with natural relations, as father, mother, uncle, cousin, &c. Thus also it is with relations by institution, as prince and people, general and army, &c. As to moral relations, they are the conformity or disagreement of men's free actions to laws and rules, whether human or divine. Farther, ideas may be divided into clear, or distinct; and obscure, or confused.

IDEAS (Simple) are clear, when they continue such as the objects present them to us when our organs or sensations are in good tone and order; when our memories retain them, and can produce and present them to the mind whenever it has occasion to consider them; and when, with this, the mind sees that these simple ideas are severally different one from another. The contrary to which is what we call obscurity and confusion of ideas.

A distinct idea is that wherein the mind perceives a difference from all others; and a confused idea is such a one as is not sufficiently distinguishable from another, with regard to which it ought to be different.

By real ideas are meant, such as have a foundation in nature; such as have a conformity with the real being or existence of things, or with their archetypes.

IDEAS (Fantastical or chimerical), are such as have no foundation in nature, nor any conformity with that being to which they are referred as their archetypes.

All our simple ideas are real, not that they are images or representations of what does exist, but as they are the certain effects of powers in things without us, ordained by our Maker to produce in us such sensations. They are real ideas in us, because, that by them we distinguish the qualities that are really in the bodies themselves; their reality lies in the steady correspondence they have with the distinct constitutions of real being; but whether with those constitutions as causes of patterns it matters not, so long as they are constantly produced by them.

As to complex ideas; in regard they are arbitrary combinations of simple ideas put together, and united under one general name, in forming whereof the mind uses its own liberty, some are found real, and some imaginary.

The origin and nature of ideas is a subject which has caused much dispute, from the time of the Peripatetics to the present period: we have given the opinions of Mr. Locke because they appear to us, as on the whole, more consistent with truth than any which have yet been advanced. The reader ought, however, to be informed that Locke's opinions have caused much controversy: those who wish to pursue their enquiries into this subject may be farther acquainted with the controversy by referring to Hume's Treatise on Human Nature, Reid's Inquiry into the Human Mind, Beattie's Essay on Truth, Priestley's Examination of Reid, Beattie, &c. Price's Enquiry into the Original of our Ideas, and Hartley on Man.

Under the word EXISTENCE we have briefly alluded to the scheme of the celebrated bishop Berkeley, who had converted the universe into an ideal world; in his system all is idea; he affirms that the existence of bodies out of a mind perceiving them is impossible, and a contradiction in terms. His reasoning ends in this sophism: sensible things are but the objects of sense: whenever they are not the objects of sense, they are no longer sensible things. Therefore, when they are not the objects of sense, or not perceived, they are not. But would not the bishop allow his house to be a combustible thing, unless it were actually on fire? He might, with equal force of reason prove, that unless it were in flames, it were no house at all. Ridiculous as this ideal scheme is, it has met with many abettors: should any such peruse this article, we entreat their attention to the following observations.

Solidity, figure, divisibility, &c. are either properties inhering in some substance, or substance itself (that thing, to wit, in which properties inhere, which we call, and must call, substance): if they are substance, solidity and figure will prove a solid, figured substance upon us. If they are only properties, they are either properties of our ideas, or not; if they are, then our ideas are substance with respect to these properties or the thing in which they inhere; and therefore solid, figured substances. A thing that hath solidity, figure, &c. as properties belonging to it, or predicable concerning it, must be a solid, figured thing. But that our ideas should be such, as upon this scheme they must be, is monstrous. At least, therefore, a substance must be possible, of which these are properties: for they are certainly properties of something. And if it be allowed that such properties exist now; or that the thing exists to which they belong; they will infer not only the possibility but the actual existence of matter.

Again, all geometry is conversant about quantity. If there be nothing that can be called *quantum in nature*, or without the mind; nothing to which quantity is applicable; then we have a large body of fine demonstration, and men have discovered vast numbers of eternal and undeniable properties (as of a triangle, circle, cylinder, sphere) precisely of nothing; immutable truths conversant about an impossible object: which is strangely contradictory. It hath been always allowed that *nothing* can have no properties predicable of it, nor truths demonstrable concerning it. Our ideas are not quantity: to say that would be to deny again the principal hypothesis maintained in this scheme, of an utter want of extension *in rerum natura*. And if we allow extension,

why not an extended substance? They are only ideas of quantity; and those truths are purely demonstrable of the objects of our ideas. No man ever spake of a circular thought, a spherical or triangular perception: the sine or tangent of a sensation would be a new monster in science. Where will these absurdities end? Nothing ever exposed men as this late species of scepticism. It is a wonder it should find admirers, and among mathematicians.

Moreover, what a fine branch of knowledge have we concerning extended and resisting quantity, or body? The shock of bodies against each other, particularly of elastic bodies; their perpendicular and inclined descents; their motion in circles and other curves; their centrifugal forces; their centres of gravity, oscillation or percussion? What fine and surprising theorems, concerning bodies moving in, or supported by fluids? These truths have still nothing for their object. Our ideas are not heavy, resisting, projectile, fluid, capable of being compressed or dilated; have no properties of inflection, refraction, &c. To allow that our ideas had any of these properties, would be to allow them to be solid, resisting, figured, divisible things. And to say it is impossible there can be any substance of which these are properties, or to doubt only of this, is to doubt if several useful truths may not be found out, and demonstrations given, about nothing. Let us ask, what kind of philosophy would such propositions as these make? The centrifugal forces of two equal ideas, revolving in the same time, in unequal ideas, are as their distances from the centres of these ideas. Or the volumes of compressed ideas, are reciprocally as the weights of the superincumbent ideas. Or, the spaces run over by an idea falling by its own gravity, are as the squares of the times. This would still run more oddly if dressed entirely in the language of this hypothesis, thus: The ideas of the spaces run over by an idea, falling by the idea of its own gravity, are as the ideas of the squares of the ideas of the times: for here all must be expressed by idea, their objects being impossible. These are shocking to the last degree. It is no wonder that the men who broach this scheme should bear a grudge to mathematics. They are diametrically opposite to each other: and if there be any truth in science, idealism must fall.

IDEAL. *a.* (from *idea.*) Mental; intellectual; not perceived by the senses (*Cheyne*).

IDE'ALLY. *ad.* (from *ideal.*) Intellectually; mentally (*Brown*).

IDE'NTICAL. IDE'NTIC. *a.* (*identique,* French.) The same; implying the same thing; comprising the same idea. (*Tillotson*).

IDENTITY, denotes that by which a thing is itself, and not any thing else; in which sense identity differs from similitude, as well as diversity.

Our idea of identity we owe to that power which the mind has of comparing the very being of things; whereby, considering any thing as existing at any certain time and place, and comparing it with itself as existing at any other time and place, we accordingly pronounce it the same. When we see any thing in any certain time and place, we are sure it is that very thing, and can be no other, how like soever it may be to something else in all other respects; because we conceive it to be impossible that two things of the same kind should exist together in the same place, we conclude, that whatever exits any where at the same time, excludes all of the same kind, and is there itself alone. When, therefore, we demand whether any thing be the same, or no, it refers always to something that existed at such a time, in such a place, which it was certain at that instant was the same with itself, and no other. We have ideas of three sorts of substances: Of God; of finite intelligences; and of bodies. God being eternal, unalterable, and everywhere, concerning his identity there can be no doubt. Finite spirits having had their determinate time and place of beginning to exist, the relation to that time and place will always determine to each its identity as long as it exists. And the same will hold of every particle of matter to which no addition or subtraction is made. These three exclude not one another out of the same place, yet each excludes those of the same kind out of the same place. The identity and diversity of modes and relations are determined after the same manner that substances are; only the actions of finite beings, as motion and thought, consisting in succession, cannot exist in different times and places as permanent beings: for no motion or thought, considered as at different times, can be the same, each part thereof having a different beginning of existence. From whence it is plain, that existence itself is the principium individuationis, which determines a being to a particular time and place incommunicable to two beings of the same kind. Thus, suppose an atom existing in a determined time and place; it is evident that, considered in any instant, it is the same with itself, and will be so as long as its existence continues. The same may be said of two, or more, or any number of particles, whilst they continue together. The mass will be the same, however jumbled: but if one atom be taken away, it is then not the same mass. In vegetables, the identity depends not on the same mass, and is not applied to the same thing. The reason of this is, the difference between an animate body and a crude mass of matter; this being only the cohesion of particles any-how united: the other, such a disposition, an organization of parts, as is fit to receive and distribute nourishment, so as to continue and frame the wood, bark, leaves, &c. (of an oak, for instance) in which consists the vegetable life. That, therefore, which has such an organization of parts partaking of one common life, continues to be the same plant, though that life be communicated to new particles of matter, vitally united to the living plant. The case is not so much different in brutes, but that any one may hence see what makes an animal, and continues it the same. The identity of the same man likewise

consists in a participation of the same continued life in succeeding particles of matter vitally united to the same organized body. To understand identity aright, we must consider what idea the word it is applied to stands for; it being one thing to be the same substance, another the same man, and a third the same person. An animal is a living organized body; and the same animal is the same continued life communicated to different particles of matter, as they happen successively to be united to that organized living body; and our notion of man is but of a particular sort of animal. Person stands for an intelligent being, that reasons and reflects, and can consider itself the same thing in different times and places; which it doth by that consciousness that is inseparable from thinking. By this every one is to himself what he calls self, without considering whether that self be continued in the same, or in diverse substances. In this consists personal identity, or the sameness of a rational being: and so far as this consciousness extends backward to any past action, or thought, so far reaches the identity of that person. It is the self same now it was then, and it is by the same self, with this present one, that now reflects on it that that action was done. Self is that conscious, thinking thing, whatever substance it matters not, which is conscious of pleasure and pain, capable of happiness or misery; and so is concerned for itself as far as that consciousness extends. That with which the consciousness of this present thinking can join itself, makes the same person, and is one self with it; and so attributes to itself, and owns all the actions of that thing as its own, as far that consciousness reaches.

Consciousnesss says the excellent bishop Butler, of what is past, ascertains our personal identity to ourselves; yet to say that it makes personal identity, or is necessary to our being the same persons, is to say, that a person has not existed a single moment, nor done one action, but what he can remember: indeed, none but what he reflects upon. And one should really think it self-evident that consciousness of personal identity presupposes, and therefore, cannot constitute, personal identity; any more than knowledge, in any other case, can constitute truth, which it presupposes. Though present consciousness of what we at present do and feel is necessary to our being the persons we now are; yet present consciousness of past actions or feelings is not necessary to our being the same persons who performed those actions, or had those feelings. The identity of persons cannot subsist with diversity of substance: personal identity is, therefore, as Mr. Locke expresses it, the sameness of a rational being; and the question, whether the same rational being is the same substance, needs no answer; because being and substance, in this case, stand for the same idea. Consequently, though the successive consciousnesses which we have of our own existence are not the same, yet they are consciousnesses of one and the same thing or object; of the same person, self or living agent. The person, of whose existence the consciousness is felt now, and was felt an hour or a year ago, is discerned to be, not two persons, but one and the same person, and, therefore, is one and the same. Butler's Analogy, Append. Diss. I.

This personal identity is the object of reward and punishment, being that by which every one is concerned for himself. If the consciousness went along with the little finger: when that was cut off, it would be the same self, that was just before concerned for the whole body. If the same Socrates, waking and sleeping, did not partake of the same consciousness, he would not be the same person: Socrates waking could not be, in justice, accountable for what Socrates sleeping did; no more than one twin, for what his brother-twin did; because their outsides were so like, that they could not be distinguished. But suppose I wholly lose the memory of some parts of my life, beyond a possibility of retrieving them, so that I shall never be conscious of them again; am I not again the same person that did those actions, though I have forgot them? I answer, we must here take notice what the word *I* is applied to, which in this case is the man only; and the same man being presumed to be the same person, *I* is easily here supposed to stand also for the same person. But if it be possible for the same man to have a distinct, incommunicable consciousness at different times, it is past doubt the same man would, at different times, make different persons; which we see is the sense of mankind in the solemnest declaration of their opinions; human laws not punishing the madman for the sober man's actions, nor the sober man for what the madman did; thereby making them two persons.

Thus we say, in English, such a one is not himself, or is beside himself; in which phrases it is insinuated, that self is changed, and the self same person is no longer in that man. But is not a man, drunk or sober, the same person? Why else is he punished for the same fact he commits when drunk, though he be never afterwards conscious of it? Just as much the same person, as a man that walks, and does other things in his sleep, is the same person, and is answerable for any mischief he shall do in it. Human laws punish with a justice suitable to their way of knowledge; because in these cases they cannot distinguish certainly what is real, and what is counterfeit; and so the ignorance in drunkenness, or sleep, is not admitted as a plea. For though punishment be annexed to personality, and personality to consciousness, and the drunkard is not conscious, perhaps, of what he did, yet human judicatures justly punish him, because the fact is proved against him; but want of consciousness cannot be proved for him. But in the great day, wherein the secrets of all hearts shall be laid open, it may be reasonable to think no one shall be made to answer for what he knows nothing of, but shall receive his doom; his own conscience accusing, or else excusing him.

To conclude this article: whatever sub-

stance begins to exist, it must, during its existence, be the same; whatever composition of substances begin to exist, during the union of those substances, the concrete must be the same. Whatsoever mode begins to exist, during its existence it is the same; and so if the composition be of distinct substances, and different modes, the same rule holds.

On this interesting subject the reader may farther consult chapter 4, of Drew's Essay on the Identity and Resurrection of the Human Body.

IDES, in the Roman Calendar, a name given to a series of eight days in each month; which, in the full months, March, May, July, and October, commenced on the 15th day; and in the other months, on the 13th day; from thence reckoned backward, so as in those four months to terminate on the eighth day, and in the rest on the sixth. These came between the calends and the nones. And this way of counting is still used in the Roman Chancery, and in the Calendar of the Breviary. The Ides of May were consecrated to Mercury; those of March were always esteemed unhappy, after the death of Cæsar; the time after the Ides of June was reckoned fortunate for those who entered into matrimony; the Ides of August were consecrated to Diana, and were observed as a feast by the slaves; on the Ides of September, auguries were taken for appointing the magistrates, who formerly entered into their offices on the Ides of May, and afterwards on those of March.

IDIO'CRASY. *s.* (ἴδιος and κρᾶσις). Peculiarity of constitution.

IDIOCRA'TICAL. *a.* (from *idiocrasy*). Peculiar in constitution.

I'DIOCY. *s.* (ἰδιωτία). Want of understanding. Both idiocy and lunacy excuse from the guilt of crimes: (see CRIME). For the rule of law as to lunatics, which also may be easily adapted to idiots, is, that *furiosus furore solum punitur.* In criminal cases, therefore (says Judge Blackstone), idiots and lunatics are not chargeable for their own acts, if committed when under these incapacities: no, not even for treason itself. Also, if a man in his sound memory commits a capital offence, and before arraignment for it he becomes mad, he ought not to be arraigned for it; because he is not able to plead to it with that advice and caution that he ought. And if, after he has pleaded, the prisoner becomes mad, he shall not be tried: for how can he make his defence? If, after he be tried and found guilty, he loses his senses before judgment, judgment shall not be pronounced; and if, after judgment, he becomes of nonsane memory, execution shall be stayed; for, peradventure, says the humanity of the English law, had the prisoner been of sound memory, he might have alleged something in stay of judgment or execution. Indeed, in the bloody reign of Henry VIII. a statute was made, which enacted, that if a person, being *compos mentis*, should commit high treason, and after fall into madness, he might be tried in his absence, and should suffer death, as if he were of perfect memory. But this savage and inhuman law was repealed by the statute 1 and 2 Ph. and M c. 10. For, as is observed by Sir Edward Coke, "the execution of an offender is for example, *ut pœna ad paucos, metus ad omnes perveniat*: but so it is not when a madman is executed; but should be a miserable spectacle, both against law, and of extreme inhumanity and cruelty, and can be no example to others." But if there be any doubt whether the party be *compos* or not, this shall be tried by a jury. And if he be so sound, a total idiocy, or absolute insanity, excuses from the guilt, and of course from the punishment of any criminal action committed under such deprivation of the senses: but if a lunatic hath lucid intervals of understanding, he shall answer for what he does in those intervals as if he had no deficiency. Yet, in the case of absolute madmen, as they are not answerable for their actions, they should not be permitted the liberty of acting unless under proper control; and, in particular, they ought not to be suffered to go loose, to the terror of the king's subjects. It was the doctrine of our ancient law, that persons deprived of their reason might be confined till they recovered their senses, without waiting for the forms of a commission or other special authority from the crown: and now, by the vagrant acts, a method is chalked out for imprisoning, chaining, and sending them to their proper homes.

The matrimonial contract likewise cannot take place in a state of idiocy. It was formerly adjudged, that the issue of an idiot was legitimate, and his marriage valid. A strange determination! since consent is absolutely requisite to matrimony, and neither idiots nor lunatics are capable of consenting to any thing. And therefore the civil law judged much more sensibly when it made such deprivations of reason a previous impediment, though not a cause of divorce if they happened after marriage. And modern resolutions have adhered to the sense of the civil law, by determining that the marriage of a lunatic, not being in a lucid interval, was absolutely void. But as it might be difficult to prove the exact state of the party's mind at the actual celebration of the nuptials, upon this account (concurring with some private family reasons—for which see Private Acts, 23 Geo. II. c. 6.) the statute 15 Geo. II. c. 30. has provided that the marriage of lunatics and persons under phrensies (if found lunatics under a commission, or committed to the care of trustees under any act of parliament), before they are declared of sound mind by the lord chancellor, or the majority of such trustees, shall be totally void.

Idiots and persons of nonsane memory, as

well as infants and persons under duress, are not totally disabled either to convey or purchase, but *sub modo* only. For their conveyances and purchases are voidable, but not actually void. The king, indeed, on behalf of an idiot, may avoid his grants or other acts.

I'DIOM. *s.* (ἰδίωμα). A mode of speaking peculiar to a language or dialect; the particular cast of a tongue; a phrase (*Dryden*).

IDIOMA'TICAL. IDIOMA'TIC. *a.* (from *idiom*). Peculiar to a tongue; phraseological (*Spectator*).

IDIOPA'THIC, (*Idiopathicus*, ἰδιοπαθικος, from ἰδιος, peculiar, and πάθος, an affection). A disease which does not depend on any other disease, in which respect it is opposed to a symptomatic disease, which is dependant on another.

IDIOSY'NCRASY, (*Idiosyncrasia*, *æ*, f. ἰδιοσυγκρασια, from ἰδιος, peculiar, συν, with, and κρασις, a temperament). A peculiarity of constitution, in which a person is affected by certain stimuli, which, if applied to a hundred other persons would produce no effect: thus some people cannot see a finger bleed without fainting; and thus violent inflammation is induced on the skin of some persons by substances that are perfectly innocent to others.

I'DIOT. *s.* (ἰδιώτης). A fool; a natural; a changeling (*Sandys*).

I'DIOTISM. *s.* (ἰδιωτισμὸς). 1. Peculiarity of expression; mode of expression peculiar to a language (*Hale*). 2. Folly; natural imbecility of mind.

I'DLE. *a.* (ýdel, Saxon). 1. Lazy; averse from labour (*Bull*). 2. Not engaged; affording leisure (*Shaks*). 3. Unactive; not employed (*Addison*). 4. Useless; vain; ineffectual (*Dryden*). 5. Unfruitful; barren; not productive of good (*Shakspeare*). 6. Trifling; of no importance (*Hooker*).

To I'DLE. *v. n.* To close time in laziness and inactivity (*Prior*).

IDLEHE'ADED. *a.* (*idle* and *head*). 1. Foolish; unreasonable (*Carew*). 2. Desirous; infatuated (*L'Estrange*).

I'DLENESS. *s.* (from *idle*). 1. Laziness; sloth; sluggishness; aversion from labour (*South*). 2. Absence of employment. (*Sidney*). 3. Omission of business (*Shakspeare*). 4. Unimportance; trivialness (*Shaks.*) 5. Inefficacy; uselessness. 6. Barrenness; worthlessness. 7. Unreasonableness; want of judgment.

I'DLER. *s.* (from *idle*). A lazy person; a sluggard (*Raleigh*).

I'DLY. *ad.* (from *idle*). 1. Lazily; without employment (*Shaks.*) 2. Foolishly; in a trifling manner (*Prior*). 3. Carelessly; without attention. 4. Ineffectually; vainly (*Hooker*).

I'DOL. *s.* (εἴδωλον; *idolum*, Latin). 1. An image worshipped as God (*Mac.*) 2. A counterfeit (*Zech.*) 3. An image (*Dryden*). 4. A representation; not in use (*Spenser*). 5. One loved or honoured to ad ration (*Den.*)

IDO'LATER. *s.* (*idolatra*, Latin). One who pays divine honours to images; one who worships for God that which is not God. (*Bentley*).

To IDO'LATRIZE. *v. n.* (from *idolater*). To worship idols (*Ainsworth*).

IDO'LATROUS. *a.* (from *idolater*). Tending to idolatry; comprising idolatry (*Peach*).

IDO'LATROUSLY. *ad.* (from *idolatrous*). In an idolatrous manner (*Hooker*).

IDO'LATRY. *s.* (*idololatria*, Lat.) The worship of images (*South*).

IDO'LATRY, from ειδωλολατρεια, which signifies the same; composed of ειδος, image, and λατρευειν, to serve, the worship and adoration of false gods; or the giving those honours to creatures, or the works of man's hands, which are only due to God.

Idolatry may be distinguished into two sorts. By the first, men adore the works of God, the sun, the moon, the stars, angels, demons, men, and animals: by the second, men worship the work of their own hands, as statues, pictures, and the like: and to these may be added a third, that by which men have worshipped the true God under sensible figures and representations. This indeed may have been the case with respect to each of the above kinds of idolatry; and thus the Israelites adored God under the figure of a calf.

The stars were the first objects of idolatrous worship, on account of their beauty, their influence on the productions of the earth, and the regularity of their motions, particularly the sun and moon, which are considered as the most glorious and resplendent images of the Deity; afterwards, as their sentiments became more corrupted, they began to form images, and to entertain the opinion, that, by virtue of consecration, the gods were called down to inhabit or dwell in their statues. Hence Arnobius takes occasion to rally the pagans for guarding so carefully the statues of their gods, who, if they were really present in their images, might save their worshippers the trouble of securing them from thieves and robbers.

As to the adoration which the ancient pagans paid to the statues of their gods, it is certain, that the wiser and more sensible heathens considered them only as simple representations or figures designed to recall to their minds the memory of their gods. This was the opinion of Varro and Seneca: and the same sentiment is clearly laid down in Plato, who maintains, that images are inanimate, and that all the honour paid to them has respect to the gods whom they represent. But as to the vulgar, they were stupid enough to believe the statues themselves to be gods, and to pay divine worship to stocks and stones.

Soon after the flood, idolatry seems to have been the prevailing religion of all the

world; for, wherever we cast our eyes at the time of Abraham, we scarcely see any thing but false worship and idolatry. And it appears from Scripture, that Abraham's forefathers, and even Abraham himself, were for a time idolaters. The Hebrews were indeed expressly forbidden to make any representation of God; they were not so much as to look upon an idol: and from the time of the Maccabees to the destruction of Jerusalem, the Jews extended this precept to the making the figure of any man: by the law of Moses, they were obliged to destroy all the images they found, and were forbidden to apply any of the gold or silver to their own use, that no one might receive the least profit from any thing belonging to an idol.

The principal causes that have been assigned for idolatry are, the indelible idea which every man has of God, and the evidence which he gives of it to himself; an inviolable attachment to the senses, and a habit of judging and deciding by them, and them only; the pride and vanity of the human mind, which is not satisfied with simple truth, but mingles and adulterates it with fables; the ignorance of antiquity, or of the first times, and the first men, whereof we have but very dark and confused knowledge by tradition, they having left no written monuments or books; the ignorance and change of languages; the style of the oriental writings, which is figurative and poetical, and personifies every thing; the superstitions, scruples, and fears, inspired by religion; the flattery of writers; the false relations of travellers; the fictions of poets; the imaginations of painters and sculptors; a smattering of physics, that is, a slight acquaintance with natural bodies and appearances, and their causes; the establishment of colonies, and the invention of arts, mistaken by barbarous people; the artifices of priests; the pride of certain men, who have affected to pass for gods; the love and gratitude borne by the people to certain of their great men and benefactors; and finally the Scriptures themselves ill understood.

I'DOLIST. *s.* (from *idol*). A worshipper of images (*Milton*).

To I'DOLIZE. *v. a.* (from *idol.*) To love or reverence to adoration (*Denham*).

IDOMENEUS, king of Crete, succeeded his father Deucalion on the throne, and accompanied the Greeks to the Trojan war, with a fleet of ninety ships. During this war, he rendered himself famous by his valour. At his return he made a rash vow to Neptune in a dangerous tempest, that if he escaped, he would offer to the god whatever living creature first presented itself to his eye on the Cretan shore. This was his son, who came to congratulate his safe return. Idomeneus performed his promise, and the inhumanity of this sacrifice rendered him so odious to his subjects, that he left Crete, in quest of a new settlement. He came to Italy, and founded a city called Salentum. He died in an extreme old age, after he had had the satisfaction of seeing his new kingdom flourish, and his subjects happy.

IDO'NEOUS. *a.* (*idoneus*, Latin.) Fit; proper; convenient; adequate (*Boyle*).

IDRIA, a town of Germany, in the duchy of Carniola. Here are rich quicksilver mines. Lat. 46. 20. N. Lon. 13. 52. E.

IDSTEIN, a town of Germany, in Weteravia. Lat. 50. 2. N. Lon. 8. 23. E.

IDULEA, in antiquity, eggs offered to Jupiter on the ides of every month.

IDUMÆA. See Edom.

IDYL, IDY'LLION, in poetry, a little poem, containing the description or narration of some adventures.

The word is derived from the Greek ειδυλλιον, diminutive of ειδος, figure, representation; because this poetry consists in a lively natural image, or representation of things.

Theocritus is the oldest author who has written idyls or idyllions. The Italians imitated him, and have brought the idyllion into modern use.

The invention of the idyllion is ascribed to Daphnis, who by his extraordinary genius, says Diodorus Siculus, "first produced the bucolic poem and song, in the form it continues to appear at present, in Sicily." This passage is considerable, as it fully ascertains the origin of the idyllion, such as it appears in Theocritus, and those that have imitated him.

After Daphnis, another Sicilian shepherd, called Diomus, made himself famous for his pastoral poems. Next came Stesichorus, who, according to Ælian, was the first that made the misfortunes of Daphnis the subject of his songs. He lived, as some chronologers will have it, in the time of Phalaris, about 550 years before the vulgar era; and lastly, some ages after this, Theocritus appeared, who forming himself on these first models, so far excelled, as to give pastoral poetry all the perfection it was capable of receiving. (*Mem. Acad. Inscrip. tom.* ix. *p.* 101).

The idyllions of Theocritus have a peculiar delicacy; they appear with a clownish, rustic kind of simplicity, but are full of the most exquisite beauties; they seem drawn from the breast of nature herself, and to have been dictated by the graces.

The modern idyllions differ from those of the ancients, by introducing none but allegorical shepherds or courtiers disguised in their dress; whereas those of the ancients represent true shepherds. Mr. Hardion observes, that the taste of the present age is so very different from that of the ancients in this respect, that he would not take upon him to give a literal translation of Theocritus's idyllions; not that he reckons them bad in themselves, nor that he condemns the rules followed in their composition; but because the rules that were good at the time

those poems were written, would, in the present age, be relished but by very few.

The subject of idyllions, as being low of itself, requires the greatest elegance of diction to set it off. Mr. Hardion is of opinion, that Theocritus has the advantage of Virgil in this respect; observing always the structure peculiar to pastoral poems, which constitutes one of its chief beauties. This structure requires that the fourth foot of every verse should be a dactylus, and sometimes also the first, when it can be done without affectation. Besides, it is also necessary these dactyli should be made without any cæsura following; and if possible there should be a rest in the sense after each dactyle, which would add greatly to the regularity and perfection of each verse. Such are the following verses of Theocritus and Virgil:

Ειπε μοι, ω Κορυδων, τινος αι βοες; ηρα Φιλωνδα.
Theoc. Idyl. iv. ver. 1.

Dic mihi, Damæta, cujum pecus? An Melibœi?
Virg. Ecl. iii. ver. 1.

I. E. for *id est*, or *that is*.

JE'ALOUS. *a.* (*jaloux*, French.) 1. Suspicious in love (*Dryden*). 2. Emulous; full of competition (*Dryden*). 3. Zealously cautious against dishonour. 4. Suspiciously vigilant (*Clarendon*). 5. Suspiciously careful (*Decay of Piety*). 6. Suspiciously fearful (*Swift*).

JE'ALOUSLY. *ad.* Suspiciously; emulously.

JE'ALOUSNESS. *s.* (from *jealous.*) The state of being jealous; rivalry; suspicion (*King Charles*).

JEALOUSY, in ethics, is that peculiar uneasiness which arises from the fear that some rival may rob us of the affection of one whom we greatly love, or suspicion that he has already done it. The first sort of jealousy is inseparable from love before it is in possession of its object: the latter is often unjust, generally mischievous, always troublesome.

Jealousy in the extreme contains a complication of the most tremendous passions that can agitate the human breast. Though it has love for its basis, yet it suffers the united torments of every painful emotion. It finds equal danger in the most opposite appearances. Every token of innocence is interpreted into proofs of guilt; and every instance of affection, as a mark of insulting hypocrisy.

It is a green-ey'd monster, which doth *make*
The meat it feeds on.——————
—————— Trifles light as air
Are to the jealous, confirmations strong
As proofs of holy writ (*Shakspeare's Othello*).

Under the influence of this baneful passion the mind becomes at intervals the sport of transporting hope, and wild despair; is alternately tormented by fits of rage and the depth of contrition, for excesses committed in its transports. In a word, uniting the extremes of dreadful hatred and passionate fondness, it entertains most cruel suspicions of the object it most adores; and is tempted to destroy that which it dreads to lose (*Cogan on the Passions*).

JEALOUSY, (*water of*)—a kind of water spoken of in the Levitical law, as serving to prove whether or no a woman were an adultress. The formula was this: the priest, offering her the water, denounced, "If thou hast gone aside to another, instead of thy husband, and if thou be defiled, &c. the Lord make thee a curse and an oath among thy people, by making thy thigh to rot, and thy belly to swell; and this water shall go into thy bowels, to make thy belly to swell, and thy thigh to rot." And the woman shall say, "Amen." "These curses the priest shall write in a book, and blot them out with the bitter water." When he hath made her drink the bitter water, it shall come to pass, that, if she be defiled, the water shall enter into her, and become bitter, and her belly shall swell," &c. "If she be not defiled, she shall be free, and conceive seed." (*Numbers*, chap. v.)

JEAN-D'ANGELY, a town of France, in the department of Lower Charente, and late province of Saintonge, with a late fine benedictine abbey. It is famous for its brandy, and is seated on the river Boutonne. Long. 0. 20. W. Lat. 45. 59. N.

JEAN-DE-LONE, ST. a town of France, in the department of Côte d'Or, and late province of Burgundy, seated on the river Saone. Long. 5. 19. E. Lat. 47. 8. N.

JEAN-DE-LUZ, ST. a town of France, in the department of the Lower Pyrenees, and late province of Basques, the last next Spain, with a harbour. This little town owes its opulence to the cod and whale fishery. Long. 1. 40. E. Lat. 43. 23. N.

JEAN-DE-MAURIENNE, a town of Savoy, capital of the county of Maurienne, in a valley of the same name, with a bishop's see. It is seated on the river Arc. Long. 6. 20. E. Lat. 45. 17. N.

JEAN-PIED-DE-PORT (ST.), a considerable town of France, in the department of the Lower Pyrenées, and late province of Lower Navarre. It is seated on the river Nive, and defended by a good citadel, upon an eminence, at the entrance of those passages, or defiles, in the Pyrenées, which, in this country, are called Ports. Long. 1. 33. E. Lat. 43. 12. N.

JEBB (Samuel), a learned physician, was born at Nottingham, and bred at Peterhouse, Cambridge. He was for some time librarian to the famous Jeremy Collier. On quitting the university, he settled as physician at Stratford, by Bow, where he resided till a short time before his death, which happened in 1772, leaving several children, one of whom was Sir Richard Jebb, physician to his majesty. He published, I. S. Justini Martyris cum Tryphone Dialogus, 8vo. 2. De Vita et Rebus gestis Mariæ Scotorum

Reginæ; also the same work in English, 8vo. 3. An edition of Aristides, with notes, 2 vols. 4to. 4. An edition of Bacon's Opus Majus, folio, &c.

Jebb (John), son of the dean of Cashel, was born in London, in 1736. He received his academical education at Peterhouse, Cambridge, where he obtained a fellowship. He had also some church preferment, but resigned the whole on turning Socinian, and applied to the practice of physic. He was an eager controversialist, and a warm advocate for annual parliaments and universal suffrage. He died in 1786. His miscellaneous works were published in 1787 in 3 vols. 8vo.

JEBUSÆI, one of the seven ancient people of Canaan, descendants of Jebusi, Canaan's son.

JECORA'RIA, (Jecoraria, æ, f. from *jecur*, the liver, so named from its supposed efficacy in diseases of the liver.) See Hepatica Terrestris.

JED, a river in Roxburghshire, which joins the Teviot a little below Jedburgh.

JEDBURGH, a borough in Roxburghshire, seated on the Jed, 36 miles from Edinburgh. Lat. 55. 35. N. Lon. 2. 25. W.

JEDDO, or Jedo, the capital of the empire of Japan, situate in Niphon, the largest of the Japanese islands. The houses are built of earth, and boarded on the outside. The town is nine miles in length, and six in breadth, and contains 1,000,000 inhabitants. The imperial palace is in the middle of the town, and is defended by walls, ditches, towers, and bastions. The empress has a smaller palace of her own, and there are 20 others for the concubines. Jeddo is seated in a plain, at the bottom of a fine bay, and the river which crosses it is divided into several canals. Lat. 36. 10. N. Lon. 139. 30. E.

To JEER. *v. n.* To scoff; to flout; to make mock (*Herbert. Taylor*).

To Jeer. *v. a.* To treat with scoffs (*Howel*).

Jeer. *s.* (from the verb.) Scoff; taunt; biting jest; flout; jibe; mock (*Swift*).

JE'ERER. *s.* (from *jeer.*) A scoffer; a scorner; a mocker.

JE'ERINGLY. *ad.* (from *jeering.*) Scornfully; contemptuously; in mock (*Derham*).

JEFFERSONIA, in botany, a genus of plants belonging to the class pentantria, order monogynia. Calyx, with five short oval imbricated leaves; corol, monophyllous, and funnel shaped; margin, hypocrateriform; stigma, quadrifid. One species, J. sempervirens, a shrub very abundant in the woods of Georgia, covered with blossoms many months in the year.

JEFFERY of Monmouth, a British historian in the reign of Henry I. He was born at Monmouth, where also he received his education. In 1152 he was made bishop of St. David's. He composed a fabulous history of Britain, in which he gives a long account of Brutus, grandson of Esca-Ascanius, and his passage from Greece to Albion. There are two editions of this work in Latin, one published at Paris in 1517, and the other at Heidelberg in 1587. An English translation appeared at London in 1718, in 8vo.

JEFFREYS (Lord George), an infamous English judge, was the son of a gentleman at Acton, in Denbighshire. He was educated at Westminster school, after which he was removed to the Inner Temple, where he studied the law with great application. By attaching himself to the duke of York, he obtained the place of a Welsh judge, the honour of knighthood, and the chief justiceship of Chester. His zeal for the court at length procured him the post of chief justice of the king's bench, and at the accession of James II. he was made lord chancellor. He had a share in all the arbitrary and violent transactions of that reign, and committed a great number of most flagitious actions. When James left the kingdom, Jeffreys knowing what little room he had to expect favour, endeavoured to escape also, but was discovered in Wapping, disguised as a sailor, and committed to the Tower, where he died April 18, 1689.

JEGGET, a kind of sausage.

JEGUN, a town of France, in the department of Gers. Lat. 43. 45. N. Lon. 0. 21. E.

JEHOVAH, יהוה (*Jeve.*) in theology, one of the scripture names of God; signifying the Being who is self-existent, and who gives existence to others. See God.

So great a veneration had the Jews for this name, that they left off the custom of pronouncing it; whereby its true pronunciation was forgotten. They call it *Tetragrammation*, or the name with four letters; and believe that whoever knows the true pronunciation of it, cannot fail to be heard by God.

JEHUD, or Joud, mountains in the N. W. part of Hindoostan Proper, extending from Attock eastward to Bember. They are part of the territory of the mountaineers, called Gickers, Gehkers, or Kakares.

JEJU'NE. *a.* (*jejunus*, Latin.) 1. Wanting; empty; vacant (*Bacon*). 2. Hungry; not saturated (*Brown*). 3. Dry; unaffecting (*Boyle*).

JEJU'NENESS. *s.* (from *jejune.*) 1. Penury; poverty (*Bacon*). 2. Dryness; want of matter that can engage the attention.

JEJU'NUM, in anatomy, the second of the small intestines; so called from the Latin *jejunus*, "hungry," because it is always found empty.

JE'LLIED. *a.* Glutinous; brought to a state of viscosity (*Cleaveland*).

JE'LLY. *s.* (*gelatinum*, Lat. See Gelly.) 1. Any thing brought to a state of glutinousness and viscosity (*Shakspeare.*) 2. Sweetmeat made by boiling sugar in the gelly (*Pope*).

Jelly. Modern chymists have given this name to the mucilaginous substance, very soluble in water, and not at all in spirits of

wine, that is obtained from all the soft and white parts of animals, such as the membranes, tendons, aponeuroses, cartilages, ligaments, and skin, by boiling them in water. If the decoction or jelly be strongly evaporated, it affords a dry, brittle, transparent substance, known by the name of glue.

The elementary substance of jelly is denominated gelatin. If it possesses but a very small admixture of water, it becomes glue; with a quantity somewhat increased, it is size; with a larger portion, it is reduced to mucilage or jelly. See GELATIN, and GLUTEN.

JELLY OF FRUIT, may be prepared by boiling the fruit, or its juice, to a proper consistence with sugar, which tends also to preserve it. The juice, however, of blackberries, currants, and various other fruits, if allowed to remain for some time in a state of rest, will in part spontaneously coagulate into that tremulous substance which is generally known as the constant form of jelly; and if the uncoagulated part be poured off, and the coagulum be washed with water, a pure jelly will be obtained. In the preparation of jelly for domestic purposes, care must be taken not to boil it too long; as it loses, by this means, the property of gelatinising by cooling, and assumes the form of mucilage: the danger of this is greatest when the quantity of sugar is too small to absorb the watery parts of the fruit.

JENKINS (Sir Leoline), a learned civilian and able statesman, born in Glamorganshire about the year 1623. Being rendered obnoxious to the parliament during the civil war, by adhering to the king's cause, he consulted his safety by flight; but returning on the restoration, he was admitted an advocate in the court of arches, and succeeded Dr. Exton as judge. When the queen-mother Henrietta died in 1669 at Paris, her whole estate, real and personal, was claimed by her nephew Louis XIV.; upon which Dr. Jenkins's opinion being called for and approved, he went to Paris, with three others joined with him in a commission, and recovered her effects; for which he received the honour of knighthood. He officiated as one of the mediators at the treaty of Nimeguen, in which tedious negociation he was engaged about four years and a half; and was afterwards made a privy counsellor and secretary of state. He died in 1685; and, as he never married, bequeathed his whole estate to charitable uses: he was so great a benefactor to Jesus college, Oxford, that he is generally looked on as the second founder. All his letters and papers were collected and printed in 1724, in 2 vols. folio.

JENA, a strong town of Upper Saxony, in Thuringia, with a university. It is seated on the Sala. Lat. 51. 2. N. Lon. 12. 4. E.

JENNE'TING, a species of apple.

JENO, a town of Upper Hungary. Lat. 46. 40. N. Lon. 21. 5. E.

JENYNS (Soame), an ingenious English writer, born in London in 1704, and educated at a private school, from whence he was sent to St. John's college, Cambridge. In 1728 he published a poem on the Art of Dancing. He was elected member of parliament for Cambridge in 1741, and continued to sit there either for that place or some other till 1780. He contributed some papers to the periodical paper, entituled, the World, in 1753. In 1755 he was appointed one of the lords of trade, which place he held till the board was abolished in 1780. Mr. Jenyns, in early life, was of a religious turn, but afterwards he wandered into deism. A closer inquiry brought him out of the dangerous path of scepticism, and he remained a firm and pious christian to his death, which happened in 1787. His works are; 1. Poems, 2 vols. 12mo. 2. Free Inquiry into the Origin of Evil, 12mo. 3. A View of the Internal Evidence of the Christian Religion, 12mo. 4. Political Tracts (*Watkins*).

JEOFAILE, (compounded of three French words, *J' ay failli*, "I have failed,") a term in law, used for an oversight in pleading or other proceedings at law. The showing of these defects or oversights was formerly often practised by the counsel; and when the jury came into court in order to try the issue, they said, This inquest you ought not to take; and after verdict they would say to the court, To judgment you ought not to go. But several statutes have been made to avoid the delays occasioned by such suggestions; and a judgment is not to be stayed after verdict for mistaking the Christian or surname of either of the parties, or in a sum of money, or in the day, month, year, &c. where the same are rightly named in any preceding record.

To JE'OPARD. *v. a.* To hazard; to put in danger: obsolete (*Maccabees*).

JE'OPARDOUS. *a.* (from *jeopardy*.) Hazardous; dangerous.

JE'OPARDY. *s.* (*jeu perdu*, Fr.) Hazard; danger; peril: not in use (*Bacon*).

JERBOA, in mastiology. See DIPUS.

JEREMIAH, the second of the greater prophets, was the son of Hilkiah, and a native of Anathoth, of the tribe of Benjamin. He was born about 629 years B. C. and predicted the calamities which should fall upon his country, and also upon the neighbouring nations. Giving offence hereby to the Jewish rulers, he was cast into prison. When Nebuchadnezzar took Jerusalem, Jeremiah was permitted to remain in Judæa, but Johanan, and other fugitive Jews, being resolved to go into Egypt contrary to the prophet's advice, compelled him to bear them company. Some say he was slain there by his countrymen, while others assert that he died at Babylon about 586 B. C. The

style of Jeremiah is elegiac, but pathetically tender, especially the Lamentations. In his prophecies he foretold the Babylonish captivity, the exact period of its duration, the return of the Jews, and the destruction of Babylon. He also predicted the miraculous conception of Christ, and the virtue of his atonement.

There were several collections of Jeremiah's prophecies; one made by God's command in the fourth year of Jehoiakim, chap. xxxvi. 2. This contained all the prophecies he had published to that time, as well against the other nations as against the Jews. The former of these in our present collection are put by themselves at the end of the book, from chap. xlvi. to the end of the last. But in the present copies of the Septuagint, they follow immediately after the thirteenth verse of the twenty-fifth chapter. Another collection of these prophecies, mentioned chap. i. 3. comprehends all those which Jeremiah had uttered to the time of the captivity, and were probably collected by Baruch, his amanuensis, and are put together without any regard to the order of time. To this was added another collection of prophecies, published about the time of his going down into Egypt, contained in chap. xlii. xliii. xliv. at the end of which Ezra, or some others, after the captivity, added those prophecies which Jeremiah delivered against the Gentiles. The fifty-second chapter was probably added by Ezra, and is chiefly taken out of the latter part of the second book of Kings, with additions, which Ezra might supply out of the public records. The book of Jeremiah is altogether written in Hebrew, except the eleventh verse of the tenth chapter, which is Chaldee.

St. Jerom has observed upon this prophet, that his style is more easy than that of Isaiah and Hosea; that he retains something of the rusticity of the village where he was born; but that he is very learned and majestic, and equal to those two prophets in the sense of his prophecy.

JEREMIE, a town, jurisdiction, and cape, on the southern peninsula of the island of St. Domingo. Lat. 18. 18. N. Lon. 70. 14. W.

JERICHO, or Hierichus, in ancient geography, a city of Judea; situated between Jordan and Jerusalem, at the distance of 150 stadia from the latter, and 60 from the former. Josephus says, "the whole space from Jerusalem is desert and rocky, and equally barren and uncultivated from Jericho to the lake Asphaltites; yet the places near the town and above it are extremely fertile and delicious, so that it may be justly called a divine plain, surpassing the rest of the land of Canaan, no unfruitful country, and surrounded by hills in the manner of an amphitheatre. It produces opobalsamum myrobalans, and dates; from the last of which it is called the city of palm trees, by Moses. The place is now called Raha.

Jericho, Rose of, in botany. See Anastatica.

To JERK. *v. a.* (ȝeɲeccan, Saxon.) To strike with a quick smart blow; to lash (*Swift*).

To Jerk. *v. n.* To strike up; to accost eagerly (*Dryden*).

Jerk. *s.* (from the verb.) 1. A smart quick lash (*Dryden*). 2. A sudden spring; a quick jolt that shocks or starts (*Ben Jonson*).

JE'RKEN. *s.* (cyɲtelkin, Saxon.) A jacket; a short coat; a close waistcoat (*South*).

JE'RKIN. *s.* A kind of hawk. See Falco.

JERMAH, a town of the kingdom of Fezzan. It is distinguished by the many herds of sheep and goats which are seen around it. Lat. 27. 5. N. Lon. 17. 17. E.

JEROME (St.), a celebrated father of the church, was born of Christian parents near Dalmatia, about 329. After receiving a good education under the eye of his father, he was sent to Rome, where he studied almost every branch of learning, particularly rhetoric, Hebrew, and theology. The manners of the Christians at that period gave him so much offence, that he resolved on a monastic life, though so well fitted to shine in society. He accordingly went into Syria, where he took up his residence in a gloomy desert at the age of 31, leading a life of study and devotion. After spending four years in this study, his health became so much impaired, that he was obliged to go to Antioch, where he was ordained a priest by Paulinus the bishop, in 368. He soon after went to Constantinople, and formed a close intimacy with Gregory Nazianzen. He next visited Rome, and prevailed on several persons of both sexes of rank to embrace the ascetic life, and set out with them for the Holy Land, where they built a number of monasteries, particularly at Bethlehem. Here he employed himself in works of piety, and in controverting the opinions of Origen and his followers, against whom he wrote with great asperity. He died in 420. The first edition of his works was published by Erasmus in folio, in 1526, and the last at Paris, 1693, folio.

Jerome of Prague, so called from the place of his birth, was the disciple of John Huss, and a man of considerable learning, having taken his degrees in different universities. The council of Constance cited him before them at the same time with his master, but finding that Huss was thrown into prison, he withdrew secretly to Uberlingen, where he applied for a safe conduct, which was refused. On his journey home to his own country he was arrested, and sent to Constance in chains. After a series of cruelties being practised upon him, he was consigned to the flames, which he endured with great constancy and triumph, May 30, 1416.

JERSEY, an island in the English Channel, 18 miles from the coast of Normandy in France, and 84 S. of Portland in Dorsetshire,

twelve miles long, and about six broad. It is divided into twelve parishes, but contains only eight churches. The air is healthy, and the soil fertile; though the cultivation of apple-trees for cider has occasioned a deficiency of arable land for corn. It has been computed, that 24,000 hogsheads have been made here in one year, part of it, probably, mixed with wine for the English market. The coasts abound with excellent fish. The number of inhabitants is computed at rather less than 20,000, of which 3000 are able to bear arms, and are formed into two regiments. Though subjects of England, they are governed by Norman laws, and their language is French. The civil government is entrusted to a bailiff and twelve jurats, under a governor appointed by the crown. The island is surrounded with rocks, which render navigation dangerous in stormy weather, but round are good roads at divers places, with anchorage all along the north side in ten and eleven fathoms water. Round towers, with embrasures on the top for small cannon, and loop-holes on their sides for small arms, have been built on this island at all the accessible places on the coast, since the year 1781, at which time it was surprized by a body of French, under the baron de Rullecourt, who paid dear for their rashness, being every one killed, wounded, or made prisoners, though with the loss of some lives, particularly of the gallant major Pierson. The entrance to these towers is by a door, so high up in the wall, as to be out of the reach of man, and is to be ascended by a ladder, to be drawn up when the defendants are got safely within the buildings. In many places are pieces of large cannon mounted, with store-houses near them for powder and ball. The poor people, from the scarcity of fuel, principally burn sea-weed, called vraic. The principal places are St. Helier and St. Aubin.

Jersey (New), one of the United States of America, bounded on the E. by Hudson's River and the Atlantic Ocean; on the S. by Delaware Bay; on the W. by Pennsylvania; and on the N. by a line drawn from the mouth of Mahakkamak River, in Lat. 41. 24. N. to a point in Hudson's River in Lat. 41. It is 161 miles long, and 52 broad; and is divided into 13 counties. In the year 1790, the total number of inhabitants was 184,139, of which 11,423 were slaves. The militia of this state consists of 30,000 men. Its produce is much the same as that of the neighbouring states. Trenton is the capital.

Jersey, among woolcombers, denotes the finest wool, taken from the rest by dressing it with a Jersey-comb.

Jersey (Tea, New.) See Ceanothus.

JERUSALEM, a very famous and ancient city of Palestine, in Asia. According to Manetho, the celebrated Egyptian historian, it was founded by the shepherds, who invaded Egypt in an unknown period of antiquity. According to Josephus, it was the capital of Melchizedek's kingdom. It was taken from the Jebusites by king David, who made it the capital of his kingdom, which it ever after continued to be. It was taken by Hazael, the king of Assyria, in the days of Jehoash, who slew all the nobility, but did not destroy their city. It was afterwards taken by Nebuchadnezzar, king of Babylon, in the 11th year of the reign of Zedekiah, and the Jews were led captive to Babylon; 70 years after, permission was granted by Cyrus, king of Persia, to the Jews to rebuild their city, which was done, and it continued the capital of Judea, till the time of Vespasian the Roman emperor, by whose son, Titus, it was totally destroyed. Titus endeavoured to save the temple, but it was to no purpose; for after it was reduced to ashes, the Roman soldiers ploughed up its foundations in quest of treasure: and for the like reason, not only the bellies of the dead, but those of the living were ripped up, under the supposition that they had swallowed vast quantities of gold. Above 1,100,000 Jews are said to have perished during this siege; and those Jews, who had been the cause of the rebellion, were crucified, by order of Titus, all around the city, till no more wood for crosses could be had. About 97,000 were taken prisoners, many of whom were sent into Egypt for slaves; about 11,000 perished with hunger; and vast quantities were transported to Syria, to be devoured by wild beasts, in the public diversions, or sold at the lowest rate for slaves. Not a descendant of David that could be found, was left alive. About the year 134, the emperor Elius Adrian, appointed a colony of heathens to rebuild the city, and named it Elia after himself. In contempt of the Jews, he ordered a marble statue of a sow to be erected over its principal gate, and for above 500 years afterwards, they durst not, without bribing the soldiers, or hazarding their lives, approach the ruins of their once sacred capital. It was taken by the Persians in 614; and by the Saracens in 636; in 1099, it was retaken by the Crusaders, who founded a new kingdom, making Jerusalem the capital, which lasted 88 years, under nine kings. Saladin, king of Egypt and Syria, got possession of it in 1187. The Turks drove away the Saracens in 1217, have kept possession of it ever since, and call it Heleods, that is, The Holy City. It is now inhabited by Turks, Arabs, Jews, and Christians. It stands on a high rock, with steep ascents on every side except to the north. It is almost surrounded by valleys encompassed with mountains, so that it seems to stand in the middle of an amphitheatre. It is about three miles in circumference, and includes Mount Calvary, which was formerly without the walls. The only thing that renders it considerable is the great resort of pilgrims; for the inhabitants accommodate them with lodgings and provisions, which is their chief business. A bashaw, with a guard of Janizaries, always resides here, to

protect them from the insults of the Arabs. The church of the Holy Sepulchre, which the pilgrims come chiefly to visit, is a large structure, with a round nave, which has no light but what comes through the top, like the Pantheon at Rome. The dome is covered on the outside with lead, and within with cedar wood. The opening of the dome is closed with a net of wire, to hinder the birds from coming into the church. In the middle of the nave, and directly under the opening of the dome, is the Holy Sepulchre, which is placed in a chapel, whose door is three feet high and two broad. It is so small, that it will hold but three persons on their knees at a time. At the entrance, on the right hand, is the place where the body of our Saviour was laid. The table on which he was said to have been laid at first, is two feet and a half high from the pavement, which is now covered with white marble, because the Christians who came to visit it were all for carrying away a small bit. This chapel is cut out of the rock, and there are three holes in the roof, to let out the smoke of the lamps, which are 44 in number, and always kept lighted. The whole is covered with white marble, both within and without; and on the outside there are 10 fine columns of the same. It is covered with a platform, the middle of which is exactly above the three holes, and forms a small dome, six feet in height, covered with lead, and supported by 12 columns of porphyry, placed by pairs on the platform, and so making six arches, having three lamps under each. Before the gate of the sepulchre is a silver lamp, so large that two men cannot fathom it. Every year, on Good Friday, all the parts of our Saviour's passion are solemnized and acted here. They have first a sermon, and then every one takes a lighted taper in his hand, with crucifixes, &c. to begin the procession. Among the crucifixes is one as large as life, being crowned with thorns, and besmeared with blood. They visit first the pillar of flagellation; next the prison; afterwards the altar of the division of Christ's garments; then they advance to the chapel of derision, and thence to Mount Calvary, leaving their shoes at the bottom of the stairs. Here are two altars; one where our Lord was supposed to be nailed to the cross, and another where it was erected, and where they set up the crucified image, which finishes the ceremony: only they pull out the nails, take down the body, and wrap it in a winding-sheet. Jerusalem is 112 miles S. W. of Damascus, and 45 from the Mediterranean. Lon. 35. 25. E. Lat. 31. 55. N.

Jerusalem, Artichoke; See Helianthus.

Jerusalem, Oak of; See Chenopodium.

Jerusalem, Sage; See Phlomis.

JESI, a town of Italy, in Ancona, with a bishop's see. Lat. 43. 30. N. Lon. 13. 16. E.

JESO, or Jedso, or Yedso, a large island in the North Pacific Ocean, governed by a prince tributary to the emperor of Japan. The inhabitants are more rude and savage than the Japanese. They live chiefly on fish and game. Lat. 42. N.

JESS. *s.* (*gecte*, French.) Short straps of leather tied about the legs of a hawk, with which she is held on the fist (*Shakspeare*).

JE'SSAMINE. *s.* See Jasaminum.

To JEST. *v. n.* (*gesticulor*, Latin.) To divert or make merry by words or actions. (*Shakspeare*).

Jest. *s.* (from the verb.) 1. Any thing ludicrous, or meant only to raise laughter (*Tillotson*). 2. The object of jests; a laughingstock (*Shakspeare*) 3. Manner of doing or speaking feigned, not real; ludicrous, not serious; game, not earnest (*Grew*).

JE'STER. *s.* (from *jest.*) 1. One given to merriment and pranks (*Shakspeare*). 2. One given to sarcasm (*Swift*). 3. Buffoon; jackpudding (*Spenser*).

JESUITA'NUS Cortex, (*Jesuitanus;* from *jesuita*, a jesuit.) A specific name of the Peruvian bark, because it was first introduced into Europe by Father de Lugo, a Jesuit. See Cinchona.

JESUI'TICUS Cortex. See Cinchona.

JESU'ITS Bark. See Cinchona.

Jesu'its, or the Society of Jesus; a famous religious order of the Romish church, founded by Ignatius Loyola. The plan which this fanatic formed of its constitution and laws was suggested, as he gave out, and as his followers still teach, by the immediate inspiration of heaven. But notwithstanding this high pretension, his design met at first with violent opposition. The pope, to whom Loyola had applied for the sanction of his authority to confirm the institution, referred his petition to a committee of cardinals. They represented the establishment to be unnecessary as well as dangerous, and Paul refused to grant his approbation of it. At last, Loyola removed all his scruples by an offer which it was impossible for any pope to resist. He proposed, that besides the three vows of poverty, of chastity, and of monastic obedience, which are common to all the orders of regulars, the members of his society should take a fourth vow of obedience to the pope, binding themselves to go whithersoever he should command for the service of religion, and without requiring any thing from the holy see for their support. At a time when the papal authority had received such a shock by the revolt of so many nations from the Romish church; at a time when every part of the popish system was attacked with so much violence and success, the acquisition of a body of men, thus peculiarly devoted to the see of Rome, and whom it might set in opposition to all its enemies, was an object of the highest consequence. Paul instantly perceiving this, confirmed the institution of the Jesuits by his bull, granted the most ample privileges to the members of the society, and appointed Loyola to be the first general of the order. The event hath fully justified

Paul's discernment, in expecting such beneficial consequences to the see of Rome from this institution. In less than half a century, the society obtained establishments in every country that adhered to the Roman Catholic church: its power and wealth increased amazingly; the number of its members became great; their character as well as accomplishments were still greater; and the Jesuits were celebrated by the friends, and dreaded by the enemies of the Romish faith, as the most able and enterprising order in the church.

The constitution and laws of the society were perfected by Laynez and Aquaviva, the two generals who succeeded Loyola, men far superior to their master in abilities and in the science of government. They framed that system of profound and artful policy which distinguishes the order. The large infusion of fanaticism mingled with its regulation should be imputed to Loyola its founder. Many circumstances concurred in giving a peculiarity of character to the order of Jesuits, and in forming the members of it not only to take greater part in the affairs of the world than any other body of monks, but to acquire superior influence in the conduct of them.

The primary object of almost all the monastic orders is to separate men from the world, and from any concern in its affairs. In the solitude and silence of the cloister, the monk is called to work out his own salvation by extraordinary acts of mortification and piety. He is dead to the world, and ought not to mingle in its transactions. He can be of no benefit to mankind but by his example and by his prayers. On the contrary, the Jesuits are taught to consider themselves as formed for action. They are chosen soldiers, bound to exert themselves continually in the service of God, and of the pope his vicar on earth.

As the object of the society of Jesuits differed from that of the other monastic orders, the diversity was no less in the form of its government. The other orders are to be considered as voluntary associations, in which whatever affects the whole body is regulated by the common suffrage of all its members. The executive power is vested in the persons placed at the head of each convent, or of the whole society; the legislative authority resides in the community. Affairs of moment, relating to particular convents, are determined in conventual chapters; such as respeet the whole order are considered in general congregations. But Loyola, full of the ideas of implicit obedience, which he had derived from his military profession, appointed that the government of his order should be purely monarchical. A general, chosen for life by deputies from the several provinces, possessed power that was supreme and independent, extending to every person and to every case. He, by his sole authority, nominated provincials, rectors, and every other officer employed in the government of the society, and could remove them at pleasure. In him was vested the sovereign administration of the revenues and funds of the order. Every member belonging to it was at his disposal; and by his uncontrollable mandate he could impose on them any task, or employ them in what service soever he pleased. To his commands they were required to yield not only outward obedience, but to resign up to him the inclinations of their own wills and the sentiments of their own understandings. They were to listen to his injunctions as if they had been uttered by Christ himself. Under his direction they were to be mere passive instruments, like clay in the hands of the potter, or like dead carcases incapable of resistance. Such a singular form of policy could not fail to impress its character on all the members of the order, and to give a peculiar force to all its operations. There is not, in the annals of mankind, any example of such a perfect despotism exercised not over monks shut up in the cells of a convent, but over men dispersed among all the nations of the earth.

Together with the power of the order, its wealth continued to increase. Various expedients were devised for eluding the obligation of the vow of poverty. The order acquired ample possessions in every catholic country; and by the number as well as magnificence of its public buildings, together with the value of its property, moveable or real, it vied with the most opulent of the monastic fraternities. Besides the sources of wealth common to all the regular clergy, the Jesuits possessed one which was peculiar to themselves. Under pretext of promoting the success of their missions, and of facilitating the support of their missionaries, they obtained a special licence from the court of Rome to trade with the nations which they laboured to convert. In consequence of this, they engaged in an extensive and lucrative commerce both in the East and West Indies. They opened warehouses in different parts of Europe, in which they vended their commodities. Not satisfied with trade alone, they imitated the example of other commercial societies, and aimed at obtaining settlements. They acquired possession accordingly of a large and fertile province in the southern continent of America, and reigned as sovereigns over some hundred thousand subjects.

Unhappily for mankind, the vast influence which the order of Jesuits acquired by all these different means, has been often exerted with the most pernicious effect. Such was the tendency of that discipline observed by the society in forming its members, and such the fundamental maxims in its constitution, that every Jesuit was taught to regard the interest of the order as the capital object to which every consideration was to be sacrificed. This spirit of attachment to

their order, the most ardent perhaps that ever influenced any body of men, is the characteristic principle of the Jesuits, and serves as a key to the genius of their policy as well as the peculiarities in their sentiments and conduct.

The Jesuits have been justly charged with inculcating the most licentious and dangerous maxims with regard to morality and religion: such are the following extracted from their writings. That persons truly wicked and void of the love of God, may expect to obtain eternal life in heaven, provided that they be impressed with a fear of the divine anger, and avoid all heinous and enormous crimes through the dread of future punishment: that those persons may transgress with safety, who have a probable reason for transgressing, i. e. any plausible argument or authority in favour of the sin they intend to commit: that actions intrinsically evil, and directly contrary to the divine laws, may be innocently performed, by those who have so much power over their own minds, as to join, even ideally, a good end to this wicked action, or, to speak in their style, who are capable of directing their intention aright: that philosophical sin is of a very light and trivial nature, and does not deserve the pain of hell: by philosophical sin they mean an action contrary to right reason, which is done by a person who is either absolutely ignorant of God, or does not think of him during the time this action is committed: that the transgressions committed by a person blinded by the seduction of lust, agitated by the impulse of tumultuous passions, and destitute of all sense and impression of religion, however detestable and heinous they may be in themselves, are not imputable to the transgressor before the tribunal of God; and that such transgressions may often be as involuntary as the actions of a madman: and that the person who takes an oath, or enters into a contract, may, to elude the force of the one, and the obligation of the other, add to the form of words that express them, certain mental additions and tacit reservations. Some of these maxims were condemned by a public edict of Pope Alexander VII. in 1659; and that relating to philosophical sin met with the same fate in 1690, under the pontificate of Alexander VIII. Neither of these bulls are to be found in the Bullarium Pontificum; but they are industriously preserved by the Jansenists and Dominicans. The corrupt morality of the Jesuits was humorously and learnedly attacked by the famous Pascal, in his work entitled Les Provinciales, ou Lettres écrits par Louis de Montalte, à un Provincial de ses Amis et aux Jesuites, sur la morale et la Politique de ces peres. The Jesuits, however, obtained a sentence against the Provinciales, by which they were condemned to be burnt publicly at Paris. Another excellent book by Perrault, published at Mons, in three volumes 8vo. in the year 1702, entitled, La Morale des Jesuites, extrait fidelement de leurs Livres, imprimés avec la permission et l'approbation des superieurs de leur Compagnie, par un docteur de Sorbonne, was burnt at Paris, in the year 1670, at the request of the Jesuits. The famous Arnauld, with some of his Jansenist brethren, have undertaken to prove, that the Jesuits reduced their pernicious maxims to practice, in a celebrated work, entitled, La Morale Pratique des Jesuites, consisting of eight vols. 8vo. the second edition of which was published at Amsterdam, in the year 1742.

It is natural to suppose that the pernicious effects attributable to the spirit and constitution of this order, would render it obnoxious to some of the principal powers in Europe; and would thus gradually produce its downfal. The emperor Charles V. saw it expedient to check its progress in his dominions; it was expelled England, by proclamation of James I. in 1604; Venice in 1606; Portugal in 1759; France in 1764; Spain and Sicily in 1767; and totally suppressed and abolished by Pope Clement XIV. in 1773.

JESUS (the Son of Sirach), a native of Jerusalem, composed, about 200 B. C. the book of Ecclesiasticus, called by the Greeks Πανάρετος, "replenished with virtue;" who also quote it under the title of The Wisdom of Solomon the Son of Sirach. His grandson, who was also of the same name, and a native of Jerusalem, translated it from the Hebrew into Greek about 121 B. C. We have this Greek version, but the Hebrew text is lost.

Jesus Christ, the son of God, and Saviour of mankind, descended from heaven, and took upon him the human nature in Judæa, towards the conclusion of the reign of Herod the Great, king of that country. The place of his birth was Bethlehem, a flourishing city of Judah; but the year in which he was born is not precisely ascertained. The most general opinion is, that it happened about the year of Rome 748 or 749, and about 18 months before the death of Herod. The history of Jesus Christ, and the means by which the truth of his religion was made manifest to the world, are amply detailed in the holy scriptures. And, as we hope and trust those invaluable oracles of God are in the hands of all the readers of this work, we shall not attempt to abridge so interesting a history as that of our Lord, but earnestly refer to the records of eternal truth. For an excellent defence of the great fact of the Resurrection of Jesus Christ, we refer to Mr. West's admirable, well-known, and unanswerable piece. And, as the belief of the divinity of our Lord appears to us of the utmost importance, we shall here state, from a popular work, the insuperable difficulties which attend the denial of that doctrine.

The New Testament writers taught the

heathens to call Jesus Christ *God;* however, they only meant to inform them, that Jesus Christ was an extraordinary *man.* They knew the heathens had for ages been accustomed to deify every extraordinary man; they intended to eradicate this idolatrous custom; and they undertook to do so by putting into their hands the history of a *man*, whom they called *God*, and to whom they ascribed more powerful and more beneficent *acts*, than poets, philosophers, and historians had ever thought of ascribing to heathen *deities*.

The writers of the New Testament described Jesus Christ to the Jews, a people zealous to superstition of every name and title of the one living and true God, by those very names and titles, by which that nation had for time immemorial described *God;* however, they only meant to inform the Jews that Jesus was an extraordinary *man.*

The writers of the New Testament ascribed to Jesus Christ those attributes and perfections which no mortal had ever pretended before to ascribe to any except to the *Almighty God*; and they did this in order to show that he who possessed these perfections, was a great *man*. The writers of the history of Jesus declare, that he created the world, and that he preserves it; that he redeemed the church, and that he sanctifies and saves it; that he is master of all, and that he shall be judge of all mankind. All these works, the performance of which, requiring infinite perfections, had always been ascribed to *God*, these writers ascribe to Jesus, for the sake of convincing the world that he was an extraordinary *man.*

The writers of the New Testament actually worshipped Jesus Christ THEIRSELVES, they said, THE FIRST MARTYR died invoking him; they declared, that ALL THE ANGELS OF GOD were commanded to *worship him*; they said, they saw *ten thousand times ten thousand, and thousands of thousands round about the throne, and heard them say, Glory and honour be unto the Lamb for ever and ever.* They required EVERY KNEE *to bow at the name of Jesus.* Every knee *in heaven*, every knee *on earth*, and every knee *under the earth*; they demanded this homage to be paid to Christ by men, who had always protested against the paying of such homage to any but God; however, they never intended to persuade men to worship Jesus as *God*, they only meant to procure a high degree of veneration to him as a very great *man.*

The writers of the New Testament applied a great many prophecies, which foretold works to be performed by Almighty God, to Jesus Christ; they fixed on certain events in his life, and they declared that the production of these events was the accomplishment of the forementioned prophecies: yet they did not mean to insinuate that Jesus was *God Almighty*; they only meant, that his doing what the prophets had said another should do, proved him to be the *servant* of that other, and a very extraordinary *man.*

The prophets had foretold, that Jesus should destroy idolatry, and bring men to worship the one living and true God of Israel. Jesus and his apostles endeavoured to fulfil these predictions: but, without their foreseeing what would happen, the disciples of Jesus worshipped him, a *man*, and not the *God* of Israel, and the bulk of Christians have continued to do so for upwards of seventeen hundred years, and are likely to do so to the end of the world.

The Lord Jesus encouraged his followers to believe, that the spirit of truth should abide with them for ever: yet, it appears by the event, Jesus Christ did not include in the promise that first great truth of Christianity, on which all the rest are founded, the doctrine of his *person*; the Turks are in possession of this truth, the generality of Christians have lost it. It is a point, which Christians have always studied in those records, which are alone capable of informing them, it is a point, which Turks have never studied, being destitute of records, and of inclination to procure them; and yet the Turks are in possession of the true notion of Christ's person, and the generality of Christians have embraced a false one.

Finally. A great many expressions peculiar to revelation are easy and natural, if the divinity of Christ be allowed; which, if Christ be a mere man, either have no meaning or an absurd one; and yet Jesus is a mere man, and the expressions in question are capable of a very proper meaning by the help of learned and critical remarks, which criticisms, although essential to the understanding of those expressions, can never be understood by those plain readers, for whose sakes the expressions were written.

I appeal to every one, whether the doctrine of our Lord's divinity be embarrassed with any difficulties equal to these; and whether these considerations ought not to induce us to allow St. John's proposition, HE, WHO WAS MADE FLESH, WAS GOD.

A Christian, who admits the truth of this proposition, walks in a plain and easy path. He reasons thus: The inspired writers call Jesus God: therefore he is God. The writers of the New Testament describe Jesus by the same names, titles, attributes, and works, by which the prophet described God: Therefore he is God. Jesus is worshipped by all the host of heaven. Jesus teaches his followers to do the will of God on earth as it is done in heaven: therefore I will worship Jesus on earth, as the angels worship him in heaven (*Robinson's Plea for the Divinity of Jesus Christ*, pa. 128—135).

JESUS, the name of a man who before the taking of Jerusalem by Titus, announced to the Jews the dreadful calamities which were about to fall upon them. Four years before the war, he went about proclaiming

the judgments of the Almighty on that devoted city, "Woe, woe to Jerusalem." Being taken and brought before the magistrates, and interrogated, his only answer was, "Woe to Jerusalem!" At the time of the siege he went about crying, "Woe to the temple! Woe to the city! Woe to the people!" and at last he cried, "Woe to myself!" and at that instant was killed by a dart (*Josephus*).

JET, in Oryctology. (See BITUMEN).

JET. (*jet*, French) A spout or shoot of water (*Blackmore*).

To JET. *v. n.* (*jetter*, French.) 1. To shoot forward; to shoot out; to intrude; to jut out (*Shakspeare*). 2. To strut; to agitate the body by a proud gait (*Shakspeare*). 3. To jolt; to be shaken (*Wiseman.*)

JET D'EAU, a French word, signifying a fountain that casts up water to any considerable height in the air.

It is well known, that a *jet d'eau* will never raise water so high as its reservoir; and therefore gives less water than if it went to the full height. Of this phenomenon, there are several causes: the first is, that the velocity of the lower particles of the jet is greater than the velocity of the upper; and therefore the lower water strikes that which is next above it; and as fluids move every way, by its impulse, widens and consequently shortens the column. Another cause is, that the water at the top of the jet does not immediately fall off, but forms a kind of ball or head, the weight of which depresses the jet; if the jet be a little inclined, it will play higher, but be less beautiful: besides, the friction against the sides of the hole of the ajutage, or spouting pipe, will make a small jet rise to a less height than a larger one from the same reservoir. To remedy this inconvenience, the spouting holes should be increased in proportion to the height of the spouting water, provided that they are not made too wide for the pipe of conduct. The fourth cause is the air's resistance, which is proportional to the square of the velocity with which the water of the jets of different heights strikes it: and, therefore, the deficiency in height being in the same proportion, a jet that plays with a double velocity will have that deficiency four times as great, &c. Thus if a jet of five feet high loses one inch in height, by coming from a reservoir of five feet one inch high, a jet produced from a reservoir of ten feet four inches, will rise but ten feet; and in this manner a table might be easily formed, showing by what height of reservoirs jets of a determinate height may be produced.

JET *rings*, annular pieces of jet found in many parts of England, and esteemed Roman antiquities. They are too small to go upon the wrist, and too large for the fingers.

JE'TSAM. } *s.* (*jetter*, French.) Goods
JE'TSON } which having been cast overboard in a storm, or after shipwreck, are thrown upon the shore, and belong to the lord admiral.

JETTE, the border made round the stilts under a pier, in certain old bridges, being the same with starling; consisting of a strong framing of timber filled with stones, chalk, &c. to preserve the foundations of the piers from injury.

JE'TTY. *a.* (from *jet.*) 1. Made of jet. 2. Black as jet (*Brown*).

JETTY-HEAD, a name usually given in the royal dock-yards to that part of a wharf which projects beyond the rest; but more particularly the front of a wharf, whose side forms one of the cheeks of a dry or wet dock.

JEVER, a town of Westphalia, capital of Jeverland, with a citadel. Lat. 53. 33. N. Long. 7. 41. E.

JEVERLAND, a territory of Germany, in Westphalia, belonging to the house of Anhalt-zerbst.

JEWEL (John), a learned English prelate, was born at Buden in Devonshire, and educated at the school of Barnstaple, from whence he removed to Oxford, where he was first entered of Merton, and afterwards of Corpus Christi College. In the time of Edward VI. he openly avowed the protestant religion, and became an admired preacher, which in the succeeding reign brought him into imminent danger of his life. Finding that bishop Bonner was devising means to apprehend him, he went abroad, and resided with Peter Martyr, at Strasburg, and afterwards at Zurich. On the death of Mary he returned home, and was appointed one of the sixteen divines who were to hold a disputation with as many of the Romanists before Queen Elizabeth. In 1559 he was preferred to the bishopric of Salisbury, and in 1565 he received the degree of D. D. from the university of Oxford. His conduct as a bishop was most exemplary, and he paid great attention to the work of reformation in his diocess. His application to study was so intense as to lay the foundation of an illness of which he died in 1571. His remains were interred in Salisbury Cathedral. His learning and abilities were celebrated all over Europe, and his Apology for the Church of England has been always looked upon as unanswerable. He published several other pieces, the whole of which were collected and printed in a folio volume.

JEWEL. *s.* (*joyaux*, French; *jeweelem*, Dutch.) 1. Any ornament of great value, used commonly of such as are adorned with precious stones (*South*). 2. A precious stone; a gem (*Pope*). 3. A name of fondness (*Shakspeare*).

JEWEL-HOUSE, *or Office*, *s.* The place where the regal ornaments are reposited.

JEWEL-BLOCKS, in the sea language, a,

name given to two small blocks which are suspended at the extremity of the main and fore-top sail yards, by means of an eye-bolt driven from without into the middle of the yard-arm, parallel to its axis. The use of these blocks is, to retain the upper part of the top-mast studding-sails beyond the skirts of the top-sails, so that each of those sails may have its full force of action, which would be diminished by the encroachment of the other over its surface.

JE'WELLER. *s.* (from *jewel.*) One who trafficks in precious stones (*Boyle*).

JEWS, a name derived from the patriarch Judah, and given to the descendants of Abraham by his eldest son Isaac, who for a long time possessed the land of Palestine in Asia, and are now dispersed through all nations in the world. The history of this people, as it is the most singular, so is it also the most ancient in the world; and the greatest part being before the beginning of profane history, depends entirely on the authenticity of the Old Testament, where it is only to be found. With regard to the religious doctrines and rites of the Jews, we shall here observe that Judaism was but a temporary dispensation, and was to give way, at least the ceremonial part of it, at the coming of the Messias. We have a complete system of Judaism in the books of Moses. The Jews were anciently divided into several sects; the principal whereof were the Pharisees, Sadducees, and Essenians. At present there are two sects among the Jews, viz. the Caraites, who admit of no rule of religion but the law written by Moses; and the Rabbinists, who add to the law the traditions of the Talmud.

It has been observed, that Judaism, of all religions, is that which is the most rarely abjured. In the 18th of Edward I. the parliament granted the king a fifteenth for the expulsion of Judaism.

In England formerly, the Jews, and all their goods, belonged to the chief lord where they lived; and he had such absolute property in them that he might sell them, for they had not liberty to remove to another lord without leave. Mat. Paris tells us, that Henry III. sold the Jews to earl Richard, his brother, for a term of years, that quos rex excoriaverat comes evisceraret.

They were distinguished from the Christians, both living and dying; for they had proper judges and courts wherein their causes were tried: and they wore a badge on their breast over their clothes, in shape of a table; and they were fined if they stirred abroad without such badges. They were never buried in the country, but always brought up to London, and interred without the walls.

In this enlightened period, however, a more generous system is taking place. France has allowed them the rights of citizens; which induces numbers of the most wealthy Jews to fix their residence in that country. England, Holland, and Prussia tolerate and protect them; and the emperor has revoked some restrictions; for which an edict has lately passed: Spain, Portugal, and some of the Italian states, are still however, totally averse to their dwelling among them.

Whatever may be the ideas of the Israelites in this country, it is certain their brethren on the Continent look up to the French emperor, as their great promised deliverer and saviour. "The time of our trial," say they, "is expired, the period of our calamities is ended! All the persecutions we have sustained have only tended to unite us the more closely together. We have at all times remained faithful to the commandments of the Lord our God: for our recompense he has determined in his wisdom that we shall be received into the bosom of other nations, to enjoy the happiness of our forefathers: but to fulfil this object, it was necessary to find a man whose virtues, whose valour and wisdom should exceed every thing which had been before admired by mortals! Napolean appeared! and God Almighty immediately supported him with the arm of his power. He recalled him from Egypt, while he subjected the tempestuous ocean to his divine laws: he sent his angels to guide his steps, and to watch over his precious life: his divine spirit inspired this hero in the field of battle as in the midst of his palace: from the summit of the hills and mountains he shewed him his enemies, dispersed in the plains of Austerlitz and Jena." Thus are the riches and fire of the oriental genius, conjoined with the warmth of adulation peculiar to the French people, made to express the hopes and enjoyments of the children of Israel! This is an epoch in the Jewish history deserving a more minute detail, and worthy of being preserved from the perishing records of newspapers and pamphlets. Posterity will see how far these flattering prospects have been built on a permanent or sandy foundation.

In May, 1806, was issued by the French emperor, the following very extraordinary decree concerning the Jews.

"*Palace of St. Cloud, May* 30, 1806.

"Napolean, emperor of the French, and king of Italy.

"Accounts having reached us, that in several of the northern departments of our empire, certain Jews, not exercising any other profession than that of usury, have, by extorting an enormous interest, reduced a number of farmers to a state of very great distress: we have conceived it our duty to succour such of our subjects, as have been reduced to these sorrowful extremes by an unjustifiable avarice. These circumstances have, at the same time, furnished us with an opportunity of knowing the urgent necessity of reanimating the sentiment of civil morality among those persons who profess the Jewish religion in the countries under our jurisdiction; sentiments which unhappily have been distinguished among a great number of them in consequence of the state of debasement under which they have long languished, which it has never entered into my views either to maintain or renew. For the accomplishment of this design, we have resolved to collect the principal persons among the Jews in an assembly; and then, through the means of commissioners, whom we shall nominate for the purpose, to communicate our intentions; and who will, at the same time, learn their wishes in respect to such manner as they may deem most expedient to awaken among their brethren the exercise of the arts and useful professions of life, in order that an honest industry may take the place of those scandalous resources to which many persons among the Jews have given themselves up, from the father to the son, for several years past. To this end, and upon the report of our grand judge, minister of justice, our minister of the interior, our council of state, &c. we declare as follows:

"1. The execution of all contracts or actions against farmers not merchants, shall be suspended for one year, reckoning from the date of the present decree, simple conservatory acts excepted; such farmers belonging to the departments of Le Sarre, Roer, Mont Tonnere, Haut, and Bas Rhin, Rhin and Moselle, Moselle and Vosges, in cases where they have been granted in favour of the Jews. 2. On the 13th of July next, an assembly of individuals professing the Jewish religion shall be held in our good city of Paris. This assembly is to be formed of those Jews only who inhabit the French territory. 3. The members shall be regulated according to the table hereunto annexed, taken from the various departments, and selected by the prefects from among the Rabbins, proprietors of land, and other Jews the most distinguished by their probity and intelligence. 4. In the other departments of our empire, not named in the annexed table, should any individuals be found professing the Jewish religion, to the number of one hundred and less than five hundred, the prefect shall select a deputy for five hundred; and above that number to one thousand, two deputies; and so on in proportion. 5. The deputies chosen shall be at Paris before the 10th of July, and shall announce their arrival, and their place of residence, to the secretary of our minister of the interior, who shall inform them of the place, the day, and the hour when the assembly shall meet. Our minister of the interior is charged with the execution of the present decree." Here follows a list of the deputies, being seventy-four in number.

These deputies accordingly assembled at Paris on July the 15th 1806, and were met by the emperor's commissioners. At their second sitting, the commissioners put several questions to them, relative to the internal economy of the Jewish nation, and their ideas of the allegiance due from the Jews to the French government. The questions were generally answered in favour of the French. At this meeting a letter was read from M. Jacobsohn, agent of the finances at the court of Brunswick, addressed to Bonaparte. This letter was expressive of the gratification he felt in the interest which the emperor of the French had shown towards the people of the Jews in France, and praying his imperial majesty to extend the like favour and indulgence to the Israelites inhabiting the countries adjoining the French empire, and in particular to those of Germany.

On the 18th of September the commissioners again proceeded to the Jewish assembly. At this assembly the deputies were assured of the satisfaction which their answer had given his imperial majesty; and at the same time declared, that it was the wish of the emperor to ensure to them the free exercise of their religion, and the full enjoyment of their political rights. In return for this protection, the emperor declared it his intention to exact from the Jews a religious guarantee for the entire observance of the principles announced in their answers. For this purpose, it was deemed requisite to constitute a grand sanhedrin, that their engagements of loyalty, attachment, &c. might have the most permanent sanction that could possibly be given to them. This was a most august design, and promised a high day for the poor scattered and despised children of Israel. The restoration of an assembly which had but seldom been convoked since it pronounced the sentence of condemnation, at Jerusalem, upon the Saviour of the world, excited the astonishment, and roused the jealousy of the prejudiced and the vindictive, while it called forth the energies, and demanded the admiration, of not only the Jews, but the greater part of all enlightened and reflecting Christians. Now it was that the scattered sheep of the house of Israel should again have a voice among their fellow men; their declarations, as citizens, should henceforth be placed by the side of the Talmud; and they should, at length be constrained to acknowledge the authority of the laws of their country, under the awful and imposing obligations of morality and religion. This was regarded as the prelude to consequences still more important and flattering; perhaps, indeed, to nothing less than the speedy arrival of that period when they should again worship under their own vine and their own fig-tree, and none dare to make them afraid.

After assurances of liberty and protection on the one hand, and of gratitude and obedience on the other, it was agreed that a grand sanhedrin should be opened at Paris, at which should be preserved, as much as possible, the ancient Jewish forms and usages. This momentous event was announced to the dispersed remnant of the descendants of Abraham in a most grateful and pathetic address to the Jewish nation throughout France and Italy, which contained suitable advice, that the brethren would choose men known for their wisdom, the friends of truth and of justice, and capable of concurring in the great work there before them, and of giving the grand sanhedrin a sufficient degree of weight and consideration. The address concludes thus: "The sovereign arbiter of nations and of kings has permitted this empire to cicatrize its wounds, to restore that tranquillity which continued storms had interrupted, to aggrandize its destiny, to fix ours, and to give happiness to two nations, who must ever applaud him, to whom has been confided the care of their happiness after that of their defence. Paris, 24th Tishri, 5567." (6th Oct. 1806.)

This address was shortly after answered by one of concurrence and congratulation from the people of the Jewish nation at Francfort on the Main; and the prince Primate of Frankfort, following the French emperor's example, put an end to every humiliating distinction between the Jews of that city and the Christian inhabitants. The Israelites soon began to manifest the happy consequences of their emancipation by considerable improvements in education and the useful arts.

The grand sanhedrin assembled on Monday the 9th of February, 1807, while the number and distinction of the spectators added much to its solemnity. Reciprocal assurances of encouragement, congratulation, and thankfulness were exchanged, and this august assembly proceeded to make several important regulations relative to the Jewish worship and economy. Numerous addresses were read, and the most encouraging orations were delivered, while the great synagogue in the street St. Avoie, resounded the praises of the God of Israel, amid repeated cries of L'Empereur, L'Imperatrice! La Famille Imperiale! and La brave Armee Francois! It might be said of these Israelites, as it was once observed of their ancestors, that "all the people worshipped God, and the king."

Twenty-seven articles were drawn up and agreed to for the re-organization of the Mosaic

worship. Sundry regulations were also made concerning polygamy, divorce, marriage, moral relations, civil and political relations, useful professions, loans among Israelites, and loans between Israelites and those who are not Israelites.

On the 2nd of March the grand sanhedrin again sat, and passed a law for the condemnation of usury among the Jews. A most animated discourse was delivered in the Hebrew tongue by M. David Sintzheim, president of the grand sanhedrin. Translations of the discourse, in French and Italian, were afterwards read to the members assembled. A copy of this discourse, and of the whole of the preceedings of the sanhedrin, have been preserved in a publication of considerable interest, a small volume lately published, entitled, "New Sanhedrin, and Causes and Consequences of the French Emperor's Conduct towards the Jews," written we believe, by William Hamilton Reid. To this work we refer our readers for all the information necessary on this interesting subject.

Flattering, however, as these proceedings are to the Jews on the continent, it is certain that their brethren on this side the water look upon the conduct of the house of Israel in France, Italy, Holland, &c. with a jealous and suspicious eye. And it must be confessed, that to secure the blessings and rights of citizens, they have made sacrifices and concessions which seem but ill to accord with the due observance of that law which subjoins, that if a man offend in one point, he is guilty of all. That the restoration promised to this people is to be considered of a moral and political nature we think cannot be doubted. Such indeed was the opinion of the learned Bishop Warburton. Whether the regulations and decrees that have been passed in their favour in France are to be considered as the commencement of this restoration, time alone can determine. Thus much is evident, that in the restoration of Israel it is said, that every man should possess his own vine and his own fig-tree; but if the Jews are either prohibited the occupation, or excused the cultivation of land, this can never be the case; and this consideration among others, seems to have suggested an idea to Bonaparte, that his Jewish subjects ought to be constrained to assist in the cultivation of the land, and in furnishing their quota of active conscripts for the defence of his dominions and of their own property. Their improved state on the continent, in a political point of view, seems not to have been attended with a correspondent degree of moral regeneration; and the French emperor appears still to be dissatisfied with their way of life. The last decree issued concerning them was the 17th of March, 1808, which forbids them, indiscriminately, to pursue their speculations, and excuse themselves from honest labour. To partake of the fruits of the earth in his large dominions, they must also till the ground. The rich are called upon to purchase rural property, and to abandon the low pursuits of sordid avarice. This decree also annuls all obligations for loans made by Jews to minors, without the sanction of their guardians; to married women without the consent of their husbands; or to military men, without the authority of their superior officers. Bills granted by French subjects to Jews, cannot be demanded, unless their holders prove that the full value was given without any fraud. All debts accumulated by interest above five per cent., are to be reduced by the courts of law; if the interest growing on the capital exceed twenty-three per cent., the contract is to be declared usurious. No Jew is to be allowed to trade without a patent, which patent is to be granted to such individuals only who produce a certificate to the prefects that they are no usurers. These regulations are to be continued during ten years only, "in the hope, that after that period, there will be no difference between the moral character of the Jews and the other citizens of the empire." If the contrary shall appear, the law will be continued in force. It is doubtful whether the faith of the children of Israel, in Bonaparte as their reigning messiah, will not be a little staggered by these regulations. Bonaparte has had the following return made to him of the number of Jews in all the different parts of the habitable globe: viz. In the Turkish empire one million; in Persia, China, and India, on the east and west of the Ganges, three hundred thousand; and in the west of Europe, Africa, and America, one million seven hundred thousand; making an aggregate population of three millions. One third of this number are already under the dominion of the French empire. For an account of the Jewish ceremonies, &c. see the late Mr. David Levi's work on that subject.

The following is a summary of their religious creed: 1. That God is the creator and active supporter of all things. 2. That God is ONE, and eternally unchangeable. 3. That God is incorporeal, and cannot have any material properties. 4. That God shall eternally subsist. 5. That God is alone to be worshipped. 6. That whatever has been taught by the prophets is true. 7. That Moses is the head and father of all contemporary doctors, and of all those who lived before, or shall live after him. 8. That the law was given by Moses. 9. That the law shall always exist, and never be altered. 10. That God knows all the thoughts and actions of men. 11. That God will reward the observance, and punish the breach of his laws. 12. The Messiah is to come, though he tarry a long time. 13. That there shall be a resurrection of the dead when God shall think fit. These doctrines, commonly received by the Jews to this day, were drawn up about the end of the eleventh century, by the famous Jewish rabbi, Maimonides.

Here in England, in former times, the Jews and all their goods belonged to the chief lord where they lived; and he had such an absolute property in them, that he might sell them, for they had not liberty to remove to another lord without leave. They were distinguished from the Christians in their lives, and at their deaths; for they had proper judges and courts, where their causes were decided. By stat. Edward I. the Jews, to the number of 15,000, were banished out of England; and never returned, till Oliver Cromwell re-admitted them. Whenever any Jew shall present himself to take the oath of abjuration, in pursuance of the 10 George III. c. 10, the words—upon the true faith of a Christian—shall be omitted out of the oath in administering it to such persons; and the taking the oath, by persons professing the Jewish religion, without these words, in like manner as Jews are admitted to give evidence in the courts of justice, shall be deemed a sufficient taking of the abjuration-oath. If Jewish parents refuse to allow their Protestant children a maintenance suitable to their fortune, the lord chancellor, upon complaint, may make such order therein as he may think proper.

Jews-Harp. The form, size, and character of this insignificant instrument are so well known, that it would not have been introduced in this Dictionary, but for the opportunity of observing that, contemptible as it may seem to those who are acquainted with superior instruments, it is the only one practised by the ingenious and simple inhabitants of St. Kilda, and forms the constant accompaniment to the performance of their lyric poetry.

JEW'S Frankincense, in botany. See Styrax.

Jew's *Stone*, in oryctology. See Helmintholithus.

JEZIDES, among Mahometans, a term of similar import with heretic among Christians.

JEZRAEL, or Jezreel, a town in the north of Sumaria, towards mount Carmel, where stood a palace of the kings of Israel.

IF. *conjunction.* (ᵹıғ, Saxon). 1. Suppose it to be so, or it were so, that. A hypothetical particle (*Hooker*). 2. Whether or no (*Prior*). 3. Allowing that; suppose it be granted that (*Boyle*).

IGIS, a town of the country of the Grisons, with a magnificent castle. Lat. 46. 33 N. Lon. 9. 0. E.

IGLAIC, a town of Moravia, capital of a circle of the same name. It is well built, fortified, and populous, with two convents, and a college. Lat. 49. 8. N. Lon. 15. 42. E.

IGNATIA, in botany, a genus of the class pentandria, order monogynia. Calyx five-toothed; corol very long, funnel-form; drupe one-celled, many seeded; seeds irregular, angular. One species; an Indian tree, with long round branches and climbing shoots; leaves opposite, ovate, very entire, acute; panicles axillary; flowers nodding, white, odorous; fruit, heart shaped, covered with a dry bark. From this we obtain the Faba Sancti Ignatia, or Ignatius's bean. See Faba Indica.

IGNATIUS (St.), an eminent father of the church and a martyr, was a native of Syria, and a disciple of St. John the Evangelist, by whom he was ordained and made bishop of Antioch about 67. In this see he remained above 40 years, labouring with great zeal in behalf of the Christian religion. When Trajan the emperor came to Antioch in 107, and found the place full of Christians, he resolved on exterminating them, and began with Ignatius, whom he cast into prison, and left orders that he should be sent to Rome. The holy bishop was accordingly conveyed thither under the escort of 10 cruel soldiers whom he called leopards, and on his arrival was thrown to the lions in the amphitheatre. Two pious deacons of his church gathered up his remains and carried them to Antioch. We have some epistles of Ignatius extant, by which we learn the faith of the primitive church in the divinity of Christ, and the doctrine of the atonement of his death. The best edition of his works is that of Oxford in 1708, 8vo.

Ignatius *Loyola*. See Loyola.

I'GNEOUS. *a.* (*igneus*, Latin). Fiery; containing fire; emitting fire (*Glanville*).

IGNI'POTENT. *a.* (*ignis* and *potens*, Lat.) presiding over fire (*Pope*).

Igneous *Fusion*, fusion produced by means of fire.

IGNIS Gehennæ, an extravagant term used by Paracelsus to denote the universal menstruum, or *Alkahest*, an imaginary substance capable of dissolving all things, and remaining itself unaltered; a substance which he pretended to have discovered, and to have in his possession.

IGNIS Fatuus, a common meteor, chiefly seen in dark nights about meadows, marshes, and other moist places, as also in burying-grounds, and near dung-hills. It is known among people by the appellations, Will with a wisp, and Jack with a lanthern. All that is not fabulous in the history of this meteor, is probably to be ascribed to the taking fire of the carburetted hydrogen gass which arises from stagnant waters, marshes &c.

To I'GNITE. *v. a.* (from *ignis*, Latin). To kindle; to set on fire (*Grew*).

IGNI'TION. *s.* (*ignition*, French). The act of kindling, or of setting on fire (*Boyle*).

Ignition, is frequently employed to denote the state of a body when raised to a red heat, and not accompanied with flame.

Ignition is sometimes produced by the sudden compression of the air; thus, tinder, fungus, &c., may be set on fire by directing upon it in a compressed state the small quantity of air contained in a condensing syringe. This effect Mr. Nicholson asscribes, with much probability, to the diminution of capacity in the air, produced by the sudden condensation. From Mr. Dalton's experiments Mr. N. infers, that the compression of 18 atmospheres, and probably of fewer, would give the temperature of ignition. Journal, 8vo. xx, 279. M. Sage, of the French institute, has noticed various instances of the apparently spontaneous ignition and cumbustion of charcoal; which if finely powdered, laid in heaps, and exposed to the atmosphere from which it imbibes moisture very freely, will sometimes take fire unexpectedly; a cirstance which, no doubt, has been often observed by other persons. Caussigni had before remarked, that charcoal was capable of being ignited by the pressure and friction of millstones; and Malet, of Pontailler, near Dijon, has seen charcoal take fire under the pestle, at the manufactory of gunpowder established in that place. Ibid. xxiii. 278.

IGNI'TIBLE. *a.* (from *ignite*). Inflammable; capable of being set on fire (*Brown*).

IGNI'VOMOUS. *a.* (*ignivomus*, Latin). Vomiting fire (*Derham*).

IGNO'BLE. *a.* (*ignobilis*, Latin). 1. Mean of birth; not noble (*Dryden*). 2. Worthless; not deserving honour (*Shak.*)

IGNO'BLY. *ad.* (from *ignoble*). Ignominiously; meanly; dishonourably (*Dryden*).

IGNOMI'NIOUS. *a.* (*ignominieux*, Fr. *igno-*

miniosus, Latin). Mean; shameful; reproachful; dishonourable.

IGNOMI'NIOUSLY. *ad.* (from *ignominious*). Meanly; scandalously; disgracefully; shamefully; reproachfully (*South*).

I'GNOMINY. *s.* (*ignominia*, Latin). Disgrace; reproach; shame; infamy. (*Milton*).

IGNORA'MUS. *s.* (Latin). 1. *Ignoramus* is a word properly used by the grand inquest impanelled in the inquisition of causes criminal and public; and written upon the bill, whereby any crime is offered to their consideration, when they mislike their evidence as defective, or too weak to make good the presentment: all inquiry upon that party, for that fault, is thereby stopped, and he delivered (*Cowell*). 2. A foolish fellow; a vain uninstructed pretender (*South*).

I'GNORANCE. *s.* (*ignorance*, French). 1. Want of knowledge; unlearnedness. (*Hooker*). 2. Want of knowledge respecting some particular thing (*Sherlock*). 3. Want of knowledge discovered by external effect (*Common Prayer*).

I'GNORANT. *a.* (*ignorant*, Fr.) 1. Wanting knowledge; unlearned; uninstructed; unenlightened (*Pope*). 2. Unknown; undiscovered (*Shakspeare*). 3. Without knowledge of some particular. 4. Unacquainted with. (*Dryden*). 5. Ignorantly made or done (*Shakspeare*).

Ignorant. *s.* One untaught, unlettered, uninstructed (*Denham*).

I'GNORANTLY. *ad.* (from *ignorant*). Without knowledge; unskilfully; without information (*Dryden*).

To IGNO'RE. *v. a.* (*ignorer*, French). Not to know; to be ignorant of: not used (*Boyle*).

IGNO'SCIBLE. *a.* (*ignoscibilis*, Latin). Capable of pardon.

IGUFANA. See Lacerta.

IHOR, Johor, or Jor, a town of the kingdom of Malacca, now in the possession of the Dutch. Lat. 1. 15. N. Lon. 93. 55. E.

JIB, the foremost sail of a ship, being a large stay-sail extended from the outer end of the bowsprit prolonged by the jib-boom, towards the fore-top-mast-head. See Sail.

Jib-boom, a boom run out from the extremity of the bowsprit, parallel to its length, and serving to extend the bottom of the jib, and the stay of the fore-top-gallant-mast.

JIBBEL Aurez, the *mons auraceus* of the middle age, an assemblage of many very rocky mountains in Africa, in the kingdom of Algiers.

JIDDA, a seaport of Arabia Felix, on the Red-Sea, in the Sherriffate of Mecca, first surrounded with walls, in the year 1514, by El Guri, sultan of Egypt, to protect it from the Portuguese: the walls are now in a state of decay. It is situated in a barren, sandy district, and is without water. Jidda, has been always a part of the dominions of the Sherriffe of Mecca. The Turkish sultan sends, indeed, a pacha to this city; but he is not absolute sovereign of it. The supreme authority is shared between the Sherriffe and the Turkish governor. The latter is changed every year; and accordingly refuses sometimes to obey the pacha. The Sherriffe keeps an officer, who is called his visier, to represent him in this city: and on this visier, solely, do all such of the inhabitants of Jidda, as are the sherriffe's subjects, depend. The revenue arising from the customs is shared between the sultan and the sherriffe; upon which account the kiaja and the visier always attend together, when goods are examined. The dues of custom are fixed at 10 per cent. upon the value of the goods, estimated arbitrarily by the custom-house officers; so that they may be considered as equal, in reality to 12 or 15 per cent. The English, however, are particularly favoured, even more than the subjects of the sultan; they pay only 8 per cent. and are suffered to discharge this in goods, whereas all others must produce money. Although the trade of Jidda is so considerable, yet this city is no more than a mart between Egypt and India. The ships from Suez, seldom proceed farther than this port; and those from India are not suffered to advance to Suez. The circumjacent country affords nothing but Taif almonds for an object of traffic; of these, indeed, the English carry five hundred thousand weight a year to India. Balm of Mecca is also brought hither from the neighbourhood of Medina, as an article of exportation. The imports are greater, because both Mecca and Medina are to be supplied from this market. Large quantities of corn, rice, lentiles, sugar, oil, &c. are imported from Egypt, without which this part of Arabia could not possibly be inhabited. All goods from Europe come also by the way of Egypt, and on the other hand, those which are brought hither from India pass generally into Egypt: 170 miles S. Medina. Lat. 21. 28. N. Lon. 39. 22. E.

JIG, in music. See Giga.

To JIG. *v. n.* (from the noun.) To dance carelesly; to dance (*Locke*).

JIG-MAKER. *s.* (*jig* and *make.*) One who dances or plays merrily (*Shakspeare.*)

JI'GGUMBOB. *s.* (A cant word.) A trinket; a knick-knack; a slight contrivance in machinery (*Hudibras*).

JILT. *s.* (perhaps from *gillet* or *gillot*, the diminutive of *gill*, the ludicrous name of a woman.) 1. A woman who gives her lover hopes, and deceives him (*Otway*). 2. A name of contempt for a woman (*Pope*).

To JILT. *v. a.* (from the noun.) To trick a man by flattering his love with hopes, and then leaving him for another (*Dryden*).

To JILT. *v. n.* To play the jilt; to practise amorous deceits (*Congreve*).

To JI'NGLE. *v. n.* (from *jangle.*) To clink; to sound with a kind of sharp rattle (*Shakspeare*).

JI'NGLE. *s.* (from the verb.) 1. Any clink, or sharp rattle. 2. Any thing sounding; a rattle; a bell (*Bacon*).

JIONPOUR, a city of Hindustan proper, capital of a circar of the same name, in Benares. It is seated on the Goomty, and not far from the confluence of that river with the Ganges. It is now nearly in ruins, though formerly it commanded the country from the Ganges to Lucknow. Lat. 25. 45. N. Lon. 84. 7. E.

Ikan radix. A somewhat oval, oblong, compressed root, brought from China. It is extremely rare, and would appear to be of the orchis tribe.

IKENILD Street, (*Stratum Icenorum*), one of the four famous ways made by the Romans in England.

ILA, or Islay, an island of Scotland, one of the Hebrides, to the S. W. of Jura. Its greatest length is 25 miles; its breadth 18. The principal village is Bowmore, which is in a manner a new town, and has a convenient harbour. The face of the country is hilly. Several mines are wrought to great advantage; and the lead ore is very rich and productive. Here likewise are copper, emery, native quicksilver, and black lead; with immense stores of limestone, marl, coral, and shell-sand, for manure. Much corn and flax is raised here, and a great number of cattle exported. In this, and some of the neighbouring islands, multitudes of adders infest the heath. On the N. W. side of the island is the cave of Sanegmore, which is a grotto, divided into a number of far-winding passages, sometimes opening into fine expanses; again closing; for a long space, into galleries, and forming a curious subterraneous labyrinth. There are also many other caverns, the haunts of numerous wild pigeons, that lodge and breed in them.

ILCHESTER, an ancient borough in Somersetshire, with a market on Wednesdays. It once had 16 churches, but now has only one. It sends two members to parliament, and is seated on the Ivel. Lat. 50. 56. N. Lon. 2. 37. W.

ILE. *s.* (*aisle*, French.) A walk or alley in a church or public building (*Pope*).

ILE. *s.* (*aisle*, French.) An ear of corn.

ILERDA, in ancient geography, the capital of the Iligertes, situated on an eminence between the rivers Sicoris and Cinga: an unhappy city, often besieged, and often taken, because lying exposed to the incursions from Gaul; and under Gallienus it was destroyed by the Germans. Now Lerida, in Catalonia, on the river Segra.

ILESUGAGUEN, a strong town of Africa, in the kingdom of Morocco, and province of Hea, seated on a mountain.

ILEUS. *s.* (Latin.) The twisting of the intestines. See Iliac Passion.

ILEX. Holly-tree, Holm-tree. Calyx four or five-toothed; corol wheel-shaped; styleless; berry four-seeded. Nineteen species, chiefly natives of India and America: one of our own country. The following are the principal.

1. aquefolium. Common Holly. Leaves ovate, acute, spinous, glossy, undulate; flowers axillary somewhat umbelled. Common to the hedges of our own country. There are four other species.

α Leaves toothed, spinous and entire.

γ Leaves thicker, equally serrate.

δ Leaves narrower, recurved.

II. Leaves spinous on the upper surface.

This tree is in every part of it, an extremely useful material. The berries are the food of birds; the tender branches that of sheep. The tenacious gluten called bird-lime is obtained from the inner-bark well washed and beaten together. The stem bears cropping for faggots and the wood when felled makes excellent fencing; and from the closeness of its grain, is often coloured for the handles of knives and forks to resemble stained ivory.

2. I. Cassine. Leaves alternate, distant, evergreen, lanceolate, serrate; the serratures unarmed. A native of Carolina with laterne, clustered flowers, and red berries.

3. I. vomitoria. Leaves alternate, distant, rather oblong, somewhat obtuse, with crenate serratures; the serratures unarmed. A native of Florida: the flowers are in close whorls at the joints of the branches; and the berries are supposed to be poisonous.

Ileum, (*Ileum*, *i*, n. ειλεον, from ειλεω, to roll about, from its convolutions). Ileum intestinum. The last portion of the small intestines, about fifteen hands breadth in length, which terminates at the valve of the cæcum. See Intestines.

ILFRACOMBE, a seaport of Devonshire, with a market on Saturday. It has a spacious basin, formed by a good pier projecting into the Bristol Channel. The high tides here allow large vessels to enter the harbour. This port employs a number of brigs and sloops, chiefly in carrying ore from Cornwall, coal from Wales, and corn to Bristol. Lat. 51. 14. N. Lon. 4. 5. W.

ILHEOS, a seaport of Brazil, capital of Rio-los-Ilheos. Lat. 15. 5. S. Lon. 41. 25. W.

Ilia, (The plural of *Ile*, ειλη). The flanks, or that part in which is enclosed the small intestines.

Iliac Arteries. Arteriæ iliacæ. The arteries so called are formed by the bifurcation of the aorta, near the last lumbar vertebra. They are divided into internal and external. The internal iliac, also called the hypogastric artery, is distributed in the fœtus into six, and in the adult into five branches, which are divided about the pelvis, viz. the little iliac, the gluteal, the ischiatic, the pudical, and the obturatory;

and in the fœtus the umbilical. The external iliac proceeds out of the pelvis through Poupart's ligament to form the femoral artery.

Iliac Passion, (ειλεος, ιλεος, ειλειος, is described as a kind of nervous colic, whose seat is the ilium). Passio iliaca. Volvulus. A violent vomiting, in which the fecal portion of the food is voided by the mouth.

Iliac Region. The hypogastric region.

Iliacus Internus. This is a thick, broad, and radiated muscle, which is situated in the pelvis, upon the inner surface of the ilium. It arises fleshy from the inner lip of the ilium, from most of the hollow part, and likewise from the edge of that bone, between its anterior superior spinous process and the acetabulum. It joins with the psoas magnus, where it begins to become tendinous, and passing under the ligamentum Fallopii, is inserted in common with that muscle. The tendon of this muscle has been seen distinct from that of the psoas, and, in some subjects it has been found divided into two portions. The iliacus internus serves to assist the psoas magnus in bending the thigh, and in bringing it directly forwards.

Ilium os, (*Ilium*, *i*, n. from *ilia*, the small intestines, so named because it supports the ilia). The haunch bone. The superior portion of the os innominatum, which, in the fœtus, is a distinct bone. See Innominatum os.

ILISSUS, a river running to the East of Athens; which, with the Eridanus running on the West side, falls, below the city, into the sea. This river was sacred to the muses, hence called *Ilissiades*.

ILIUM, Ilion, or Ilios, in ancient geography, a name for the city of Troy, but most commonly used by the poets, and distinguished by the epithet Vetus; at a greater distance from the sea than what was afterwards called Ilium Novum, and thought to be the Iliensium Pagus of Strabo. New or modern Ilium was a village nearer the sea, with a temple of Minerva; where Alexander, after the battle of Granicus, offered gifts. From this city the *Ilias* or *Iliad* of Homer takes its name.

ILK. *ad.* (ealc, Saxon.) The same. It is still retained in Scotland, and denotes each; as, *ilk ane of you*, every one of you. It also signifies, the same; as, *Macintosh of that ilk*, denotes a gentleman whose surname and the title of his estate are the same; as, Macintosh of Macintosh.

ILKUCH, a town of Poland, in the Palatinate of Cracow, remarkable for its silver mines mixed with lead. Lat. 50. 20. N. Lon. 19. 40. E.

ILL. *a.* (contracted from Evil.) 1. Bad in any respect; contrary to good, whether physical or moral; evil (*Bacon*). 2. Sick; disordered; not in health (*Temple*).

ILL. *s.* 1. Wickedness; depravity (*Bacon.*) 2. Misfortune; misery (*Tate*).

Ill. *ad.* 1. Not well; not rightly in any respect (*Dryden*). 2. Not easily; with pain (*Milton*).

Ill, substantive or adverb, is used in composition to express any bad quality or condition.

Il, before words beginning with *l*, stands for *im*.

ILLA'CHRYMABLE. *a.* (*illachrymabilis*, Latin.) Incapable of weeping.

ILLA'PSE. *s.* (*illapsus*, Latin.) 1. Gradual immission or entrance of one thing into another (*Norris*). 2. Sudden attack; casual coming (*Thomson*).

To ILLA'QUEATE. *v. a.* (*illaqueo*, Lat.) To entangle; to entrap; to ensnare (*More*).

ILLAQUEA'TION. *s.* (from *illaqueate.*) 1. The act of catching or ensnaring (*Brown*). 2. A snare; any thing to catch another.

ILLA'TION. *s.* (*illatio*, Latin.) Inference; conclusion drawn from premises (*Loche*).

I'LLATIVE. *a.* (*illatus*, Latin.) Relating to illation or conclusion (*Watts*).

ILLA'UDABLE. *a.* (*illaudabilis*, Latin.) Unworthy of praise or commendation (*Milt.*)

ILLA'UDABLY. *ad.* (from *illaudable.*) Unworthily; without deserving praise (*Broome*).

ILLECEBRA. (*Illecebra*, *æ.* f.) A charm, or enchantment from the speedy benefit supposed formerly to have flowed from its medicinal use.) *Vermicularis. Piper murale. Sedum minus.* Wall pepper. Stone-crop. This species of sedum, *Sedum acre* of Linnéus, in its recent state, is extremely acrid, like the hydropiper; hence, if taken in large doses, it acts powerfully on the primæ viæ, proving both emetic and cathartic; applied to the skin as a cataplasm, it frequently produces vesications and erosions. Boerhaave therefore imagines that its internal employment must be unsafe; but experience has discovered, that a decoction of this plant is not only safe but of great efficacy in scorbutic complaints. For which purpose, a handful of the herb is directed to be boiled in eight pints of beer till they are reduced to four, of which three or four ounces are to be taken every, or every other morning. Milk has been found to answer this purpose better than beer. Not only ulcers simply scorbutic, but those of a scrophulous, and even cancerous tendency, have been cured by the use of this plant; of which Marquet relates several instances. He likewise found it useful as an external application in destroying fungous flesh, and in promoting a discharge in gangrenes and carbuncles. Another effect for which this plant is esteémed, is that of stopping intermittent fevers.

ILLE'CEBRUM. In botany, a genus of the class pentandria, order monogynia Calyx five-leaved, cartilaginous, inferior; coralless; stigma simple; capsule five-valv

ed; one-seeded. Nineteen species, chiefly natives of India, but a few of the southern parts of Europe and America; most of them trailing and herbaceous; but a few shrubby. One only is a native of our own country. 1. Verticillatum, found wild in moist, boggy places, with flowers in whorls, without bracks, stems procumbent.

ILLE'GAL. *a.* (*in* and *legalis*, Latin.) Contrary to law (*Swift*).

ILLEGA'LITY. *s.* (from *illegal.*) Contrariety to law (*Clarendon*).

ILLE'GALLY. *ad.* (from *illegal.*) In a manner contrary to law.

ILLE'GIBLE. *a.* (*in* and *legibilis*, from *lego*, Latin.) What cannot be read (*Howel*).

ILLEGI'TIMACY. *s.* (from *illegitimate.*) State of bastardy.

ILLEGI'TIMATE. *a.* (*in* and *legitimus*, Latin.) Unlawfully begotten; not begotten in wedlock (*Cleaveland*).

ILLEGI'TIMATELY. *ad.* Not in wedlock.

ILLEGITIMA'TION. *s.* (from *illegitimate.*) The state of one not begotten in wedlock.

ILLER, a river of Germany, which rises in Tirol, runs through Suabia, and falls into the Danube at Ulm.

ILLE'VIABLE. *a.* (*lever*, French.) What cannot be levied or exacted (*Hale*).

ILLFA'VOURED. a. Deformed (*Shaks.*)

ILLFA'VOUREDLY. *ad.* With deformity.

ILLFA'VOUREDNESS. *s.* Deformity.

ILLI'BERAL. *a.* (*illiberalis*, Latin.) 1. Not noble; not ingenuous (*King Charles*). 2. Not munificent; not generous; sparing (*Woodward*).

ILLIBERA'LITY. *s.* (from *illiberal.*) 1. Meanness of mind. 2. Parsimony; niggardliness (*Bacon*).

ILLI'BERALLY. *ad.* (from *illiberal.*) Disingenuously; meanly (*Decay of Piety*).

ILLICIT. *a.* (*illicitus*, Latin; *illicite*, Fr.) Unlawful: as, an *illicit* trade.

ILLI'CIUM. Aniseed-tree. In botany, a genus of the class polyandria, order polygynia. Calyx six-leaved; petals twenty-seven; capsules numerous, disposed in a ring, two-valved, one-seeded. Two species.

1. I. Anisatum. Inner-petals liniar-subulate; aggregate, obovate leaves; yellow flowers. A native of Japan and China.

2. I. Floridanum. Inner-petals lanceolate. A native of Florida; with red and exquisitely odorous flowers.

To ILLI'GHTEN. *v. n.* (*in* and *lighten.*) To enlighten; to illuminate (*Raleigh*).

ILLI'MITABLE. *a.* (*in* and *limes*, Latin.) That cannot be bounded or limited (*Brown*).

ILLI'MITABLY. *ad.* (from *illimitable.*) Without susceptibility of bounds.

ILLI'MITED. *a.* (*illimité*, French.) Unbounded; interminable.

ILLI'MITEDNESS. *s.* (from *illimited.*) Exemption from all bounds (*Clarendon.*)

ILLINOIS, a large river of North America, which rises in the western territory, near the south end of lake Michigan, and taking a S. W. course, falls into the Mississippi. Between the Illinois and the Ohio is the country of a noted Indian nation, called the Illinois.

ILLI'TERATE. *a.* (*illiteratus*, Latin.) Unlettered; untaught; unlearned (*Wotton*).

ILLI'TERATENESS. *s.* (from *illiterate.*) Want of learning; ignorance of science (*Boy*).

ILLI'TERATURE. *s.* (*In* and *literature.*) Want of learning (*Ayliffe*).

I'LLNESS. *s.* (from *ill.*) 1. Badness or inconvenience of any kind, natural or moral (*Locke*). 2. Sickness; malady; disorder of health (*Swift*). 3. Wickedness (*Shakspeare*).

ILLNA'TURE. *s.* (*ill* and *nature.*) Habitual malevolence; want of humanity (*South*).

ILLNA'TURED. *a.* (from *illnature.*) 1. Habitually malevolent; wanting kindness or good-will; mischievous (*South*). 2. Untractable; not yielding to culture.

ILLNA'TUREDLY. *ad.* (from *illnatured.*) In a peevish froward manner.

ILLNA'TUREDNESS. *s.* (from *illnatured.*) Want of a kindly disposition.

ILLO'GICAL. *a.* (*in* and *logical.*) 1. Ignorant or negligent of the rules of reasoning (*Walton*). 2. Contrary to the rules of reason (*D. of P.*)

ILLO'GICALLY. *ad.* (from *illogical.*) In a manner contrary to the laws of argument.

To ILLU'DE. *v. a.* (*illudo*, Latin.) To deceive; to mock (*Spenser*).

To ILLU'ME. *v. a.* (*illuminer*, French.) 1. To enlighten; to illuminate (*Shakspeare*). 2. To brighten; to adorn (*Thomson*).

ILLUMINATI. The name of a secret society, or order, in Germany and other countries on the continent, whose professed object was to propagate the purest principles of virtue; but whose real intention, it is said, was to subvert every established government and religion. If ever such society did exist, it is now extinct; and we have no wish to excite horrid emotions by a recital of any of the stories which have been told respecting it, or its members.

ILLUMINA'TING, a kind of miniature-painting, anciently much practised for illustrating and adorning books. Besides the writers of books, there were artists whose profession was to ornament and paint manuscripts, who were called illuminators: the writers of books first finished their part, and the illuminators embellished them with ornamental letters and paintings. We frequently find blanks left in manuscripts for the illuminators, which were never filled up. Some of the ancient manuscripts are gilt and burnished in a style superior to later times. Their colours were excellent, and their skill in preparing them must have been very great.

The practice of introducing ornaments, drawings, emblematical figures, and even portraits, into manuscripts, is of great antiquity. Varro wrote the lives of seven hundred illustrious Romans, which he enriched with their portraits, as Pliny attests in his Natural History (lib. xxxv. cap. 2.

Pomponius Atticus, the friend of Cicero, was the author of a work on the actions of the great men among the Romans, which he ornamented with their portraits, as appears in his Life by Cornelius Nepos (cap. 18.) But these works have not been transmitted to posterity. There are, however, many precious documents remaining, which exhibit the advancement and decline of the arts in different ages and countries. These inestimable paintings and illuminations display the manners, customs, habits, ecclesiastical, civil, and military, weapons and instruments of war, utensils and architecture of the ancients; they are of the greatest use in illustrating many important facts relative to the history of the times in which they were executed. In these treasures of antiquity are preserved a great number of specimens of Grecian and Roman art, which were executed before the arts and sciences fell into neglect and contempt. The manuscripts containing these specimens form a valuable part of the riches preserved in the principal libraries of Europe: the Royal, Cottonian, and Harleian libraries, as also those in the two universities in England, the Vatican at Rome, the Imperial at Vienna, the National at Paris, St. Mark's at Venice, and many others.

A very ancient manuscript of Genesis, which was in the Cottonian library, and almost destroyed by a fire in 1731, contained two hundred and fifty curious paintings in water colours. Twenty-one fragments, which escaped the fire, are engraven by the society of antiquaries of London. Several specimens of curious paintings also appear in Lambecius's catalogue of the imperial library at Vienna, particularly in vol. iii. where forty-eight drawings of nearly equal antiquity with those in the Cottonian library are engraven; and several others may be found in various catalogues of the Italian libraries. The drawings in the Vatican Virgil, made in the fourth century, before the arts were entirely neglected, illustrate the different subjects treated of by the Roman poet. A miniature drawing is prefixed to each of the Gospels brought over to England by St. Augustin in the sixth century, which is preserved in the library of Corpus Christi College, Cambridge; in the compartments of those drawings are depicted representations of several transactions in each gospel. The curious drawings and elaborate ornaments in St. Cuthbert's gospels made by St. Ethelwald, and now in the Cottonian library, exhibit a striking specimen of the state of the arts in England in the seventh century. The same may be observed with respect to the drawings in the ancient copy of the four gospels preserved in the cathedral church of Litchfield, and those in the Codex Rushworthianus in the Bodleian library at Oxford. The life of St. Paul the hermit, now remaining in Corpus Christi College, Cambridge (G. 2.) affords an example of the style of drawing and ornamenting letters in England in the eighth century; and the copy of Prudentius's Psycomachia in the Cottonian library (Cleop. c. 8.) exhibits the style of drawing in Italy in the ninth century. Of the tenth century there are Roman drawings of a singular kind in the Harleian library (No. 2820.) No. 5280, 1802, and 432, in the same library, contain specimens of ornamented letters, which are to be found in Irish manuscripts from the twelfth to the fourteenth century. Without mentioning others, we may observe that Mr. Strutt has given the public an opportunity of forming some judgment of the degree of delicacy and art with which these illuminations were executed, by publishing prints of a prodigious number of them, in his "Regal and Ecclesiastical Antiquities of England," and "View of the Customs, &c. of England." In the first of these works we are presented with the genuine portraits, in miniature, of all the kings, and several of the queens of England, from Edward the Confessor to Henry VII. mostly in their crowns and royal robes, together with the portraits of many other eminent persons of both sexes. The illuminators and painters of this period seem to have been in possession of a considerable number of colouring materials, and to have known the arts of preparing and mixing them, so as to form a great variety of colours: for in the specimens of their miniature paintings that are still extant, we perceive not only the five primary colours, but also various combinations of them. Though Mr. Strutt's prints do not exhibit the bright and vivid colours of the originals, they give us equally a view, not only of the persons and dresses of our ancestors, but also of their customs, manners, arts, and employments, their arms, ships, houses, furniture, &c. and enable us to judge of their skill in drawing. The figures in those paintings are often stiff and formal; but the ornaments are in general fine and delicate, and the colours clear and bright, particularly the gold and azure. In some of these illuminations the passions are strongly painted. After the introduction of printing, this elegant art of illuminating gradually declined, and at length was quite neglected.

To ILLU'MINE. *v. a.* (*illuminer*, French.) 1. To enlighten; to supply with light (*Milt.*) 2. To decorate; to adorn (*Pope*).

To ILLU'MINATE. *v. a.* (*illuminer*, Fr.) 1. To enlighten; to supply with light (*Spen.*) 2. To adorn with festal lamps or bonfires. 3. To enlighten intellectually with knowledge or grace (*Sandys*). 4. To adorn with pictures or initial letters of various colours. 5. To illustrate (*Watts*).

ILLUMINA'TION. *s.* (*illuminatio*, Latin.) 1. The act of supplying with light. 2. That which gives light (*Raleigh*). 3. Festal lights hung out as a token of joy (*Dryden*). 4. Brightness; splendour (*Felton*). 5. Infusion

of intellectual light; knowledge of grace (*Hooker*).

ILLUMINATION, *circle of.* See CIRCLE.

ILLU'MINATIVE. *a.* (*illuminatif.* French.) Having the power to give light (*Digby*),

ILLUMINA'TOR. *s.* (from *illuminate.*) 1. One who gives light. 2. One whose business it is to decorate books with pictures at the beginning of chapters (*Felton*).

ILLUMI'NED, ILLUMINATI, a church term, anciently applied to such persons as had received baptism. This name was occasioned by a ceremony in the baptism of adults; which consisted in putting a lighted taper in the hand of the person baptized, as a symbol of the faith and grace he had received in the sacrament.

ILLUMINED, *illuminati*, is also the name of a sect of heretics, who sprang up in Spain about the year 1575, and were called by the Spaniards *Alumbrados.* Their principal doctrines were, that by means of a sublime manner of prayer, which they had attained to, they entered into so perfect a state, that they had no occasion for ordinances, sacraments, nor good works; and that they could give way even to the vilest actions without sin.

ILLU'SION. *s.* (*illusio*, Latin.) Mockery; false show; counterfeit appearance; error (*Shakspeare*).

ILLU'SIVE. *a.* (from *illusus*, Latin.) Deceiving by false show (*Blackmore*).

ILLU'SORY. *a.* (*illusoire*, French.) Deceiving; fraudulent (*Locke*).

To ILLU'STRATE. *v. a.* (*illustrio*, Latin.) 1. To brighten with light. 2. To brighten with honour (*Milton*). 3. To explain; to clear; to elucidate (*Brown*).

ILLUSTRA'TION. *s.* (from *illustrate.*) Explanation; elucidation; exposition (*L'Estrange*).

ILLU'STRATIVE. *a.* (from *illustrate.*) Having the quality of elucidating or clearing (*Brown*).

ILLU'STRATIVELY. *ad.* (from *illustrative.*) By way of explanation (*Brown*).

ILLU'STRIOUS. *a.* (*illustris*, Latin.) Conspicuous; noble; eminent for excellence (*South.*)

ILLUSTRIOUS, ILLUSTRIS, was heretofore, in the Roman empire, a title of honour peculiar to people of a certain rank. It was first given to the most distinguished among the knights, who had a right to bear the latus clavus: afterwards those were entitled illustrious who held the first rank among those called honorati; that is, the præfecti prætorii, præfecti urbis, treasurers, comites, &c. There were, however, different degrees among the illustrious: as in Spain they have grandees of the first and second class, so in Rome they had their illustres, whom they called great, majores; and others less, called illustres minores. For instance, the præfectus prætorii, was a degree below the master of the offices, though they were both illustres. The Novels of Valentinian distinguish as far as five kinds of illustres; among whom, the illustres administratores bear the first rank.

ILLU'STRIOUSLY. *ad.* (from *illustrious.*) Conspicuously; nobly; eminently (*Pope*).

ILLU'STRIOUSNESS. *s.* (from *illustrious.*) Eminence; nobility; grandeur.

ILLYRICUM, (Solum perhaps understood) Livy, Herodian, St. Paul; called Illyris by the Greeks, and sometimes Illyria: the country extending from the Adriatic to Pannonia thus called. Its boundaries are variously assigned. Pliny makes it extend in length from the river Arsia to the Drinius thus including Liburnia to the west, and Dalmatia to the east: which is also the opinion of Ptolemy. The country is now called *Sclavonia.*

ILMINSTER, a town in Somersetshire, with a market on Saturday. Lat. 50. 55. N. Lon. 2. 54. W.

ILSLEY, EAST, a town in Berkshire, with a market on Wednesday. Lat. 51. 32. N. Lon. 1. 12. W.

ILSTROP, a town of Sweden, in W. Gothland. Lat. 57. 23. N. Lon. 11. 51. E.

I'M. Contracted for *I am.*

IM is used commonly, in composition, for *in* before mute letters. What is *im* in Latin, when it is not negative, is often *em* in French; and our writers, as the Latin or French occurs to their mind, use *im* or *em.*

I'MAGE. *s.* (*image*, French; *imago*, Latin). 1. Any corporeal representation, generally a statue; a picture (*South*). 2. An idol; a false god (*Chron.*). 3. A copy; representation; likeness (*Shakspeare*). 4. Semblance; show; appearance (*Shaksp*). 5. An idea; a representation of any thing to the mind (*Watts*).

To I'MAGE. *v. a.* (from the noun). To copy by the fancy; to imagine (*Dryden*).

IMAGE, in optics, is the appearance of an object made either by reflection or refraction. In all plane mirrors, the image is of the same magnitude as the object, and it appears as far behind the mirror as the object is before it. In convex mirrors, the image appears less than the object; and farther distant from the centre of the convexity, than from the point of reflection. By the following rule, the diameter of an image projected in the base of a convex mirror, may be found. "As the distance of the object from the mirror is to the distance from the image to the glass, so is the diameter of the object to the diameter of the image."

Image also signifies an artificial representation performed by man; as in painting, sculpture, and the like.—In which sense the word is now generally used in speaking of things holy, or imagined to be so.

The noble Romans preserved the images of their ancestors with a great deal of care and concern, and had them carried in pro-

cession at their funerals and triumphs: these were commonly made of wax, or wood; though sometimes of marble, or brass. They placed them in the vestibules of their houses; and they were to stay there, even if the houses happened to be sold, it being accounted impious to displace them. Appius Claudius was the first who brought them into the temples, in the year of Rome 259, and he added inscriptions to them, shewing the origin of the persons represented, and their brave and virtuous atchievements.

The use and adoration of images, are things that have been a long time controverted in the world.

It is plain, from the practice of the primitive church, recorded by the earlier fathers, that Christians, for the first three centuries after Christ, and the greater part of the fourth, neither worshipped images nor used them in their worship. However, the greater part of the Popish divines maintain, that the use and worship of images were as ancient as the Christian religion itself: to prove this, they allege a decree, said to have been made in a council held by the Apostles at Antioch, commanding the faithful, that they may not err about the object of their worship, to make images of Christ and worship them. Baron. ad ann. 102. But no notice is taken of this decree, till 700 years after the Apostolic times, after the dispute about images had commenced. The first instance that occurs in any credible author of images among Christians, is that, recorded by Tertullian de Pudicit. c. 10. of certain cups, or chalices, as Bellarmine pretends, on which was represented the parable of the good shepherd carrying the lost sheep on his shoulders: but this instance only proves, that the church, at that time, did not think emblematical figures unlawful ornaments of cups or chalices. Another instance is taken from Eusebius, Hist. Eccl. lib. vii. cap. 18. who says, that in his time there were to be seen two brass statues in the city of Paneas or Cæsarea Philippi; the one of a woman on her knees, with her arms stretched out, the other of a man over against her, with his hand extended to receive her: these statues were said to be the images of our Saviour, and the woman whom he cured of an issue of blood. From the foot of the statue representing our Saviour, says the historian, sprung up an exotic plant, which as soon as it grew to touch the border of his garment, was said to cure all sorts of distempers. Eusebius, however, vouches none of these things; nay, he supposes that the woman who erected this statue of our Saviour was a pagan, and ascribes it to a pagan custom.

The use of images in churches as ornaments, was first introduced by some Christians in Spain, in the beginning of the fourth century; but the practice was condemned as a dangerous innovation, in a council held at Eliberis in 305. Epiphanius, in a letter preserved by Jerom, tom. ii. ep. 6. bears strong testimony against images, and may be considered as one of the first ICONOCLASTS. The custom of admitting pictures of saints and martyrs into the churches, for this was the first source of image-worship, was rare in the latter end of the fourth century; but became common in the fifth: however, they were still considered only as ornaments; and even in this view, they met with very considerable opposition. In the following century the custom of thus adorning churches became almost universal, both in the East and West.

The Lutherans condemn the Calvinists for breaking the images in the churches of the Catholics, looking on it as a kind of sacrilege; and yet they condemn the Romanists (who are professed image-worshippers) as idolaters: nor can these last keep pace with the Greeks, who go far beyond them in this point; which has occasioned abundance of disputes among them.

IMAGE, in Rhetoric, also signifies a lively description of any thing in a discourse.

Images in discourse are defined, by Longinus, to be, in general, any thoughts proper to produce expressions, and which present a kind of picture to the mind.

But, in the more limited sense, he says, images are such discourses as come from us, when, by a kind of enthusiasm, or an extraordinary emotion of the soul, we seem to see the things whereof we speak, and present them before the eyes of those who hear us.

Images, in rhetoric, have a very different use from what they have among the poets: the end principally proposed in poetry is, astonishment and surprise; whereas the thing chiefly aimed at in prose, is to paint things naturally, and to shew them clearly. They have this, however, in common, that they both tend to move, each in its kind.

I'MAGERY. *s.* (from *image.*) 1. Sensible representations; pictures; statues (*Spenser*). 2. Show; appearance (*Rogers*). 3. Forms of the fancy; false ideas; imaginary phantasms (*Atterbury*). 4. Representations in writing (*Dryden*).

IMA'GINABLE. *a.* (*imaginable*, French.) Possible to be conceived (*Tillotson*).

IMA'GINANT. *a.* (*imaginant*, French.) Imagining; forming ideas (*Bacon*).

IMA'GINARY. *a.* (*imaginaire*, French.) Fancied; visionary; existing only in the imagination (*Raleigh*).

IMAGINARY Quantities, or Impossible Quantities, in Algebra, are the even roots of negative quantities; which expressions are Imaginary, or impossible, or opposed to real quantities; as $\sqrt{-aa}$, or $\sqrt[4]{-a^4}$, &c. For, as every even power of any quantity whatever, whether positive or negative, is positive, or has the sign +, because + by

$+$, or $-$ by $-$ give equally $+$; from hence it follows that every even power, as the square for instance, which is negative, or having the sign $-$, has no possible root; and therefore the even roots of such powers or quantities are said to be impossible or Imaginary. The mixt expressions arising from Imaginary quantities joined to real ones, are also Imaginary; as $a - \sqrt{-aa}$, or $b + \sqrt{-aa}$.

The arithmetic of these Imaginary quantities has not yet been generally agreed upon; viz. as to the operations of multiplication, division, and involution; some authors giving the results with $+$, and others on the contrary with the negative sign $-$. Perhaps in order to avoid both error and inconsistency, an impossible quantity ought to be separated into two factors, one of which is $\sqrt{-1}$, and the other a possible quantity; thus $\sqrt{-a}=\sqrt{-1}\times\sqrt{a}$. Then in multiplying two impossible quantities together, the impossible parts are not to be multiplied together by the common rule for Surds, but by taking off the sign. Thus, $\sqrt{-a}\times\sqrt{-b}=\sqrt{-1}\times\sqrt{a}\times\sqrt{-1}\times\sqrt{b}=\overline{\sqrt{-1}}^{2}\times\sqrt{ab}=-1\times\sqrt{ab}=-\sqrt{ab}$.

Sometimes these imaginary quantities are found to expedite demonstrations, and indeed, may often be of service in the discovery of truth, when a more rigid analysis cannot be obtained: admitting then, that in unskilful hands these quantities have introduced a disgusting jargon and air of mystery into mathematics, it ought to be considered whether this incidental inconvenience is not more than counterbalanced by their real utility; and if this should be the case, mathematicians will be justified in not entirely rejecting imaginary quantities.

Imaginary Roots, of an equation, are those roots or values of the unknown quantity in an equation, which contain some Imaginary quantity. So the roots of the equation $xx + aa = 0$, are the two Imaginary quantities $+\sqrt{-aa}$ and $-\sqrt{-aa}$, or $+a\sqrt{-1}$ and $-a\sqrt{-1}$; and the three roots of the equation $x^3 - 1 = 0$, or $x^3=1$, are 1 and $\frac{-1+\sqrt{-3}}{2}$ and $\frac{-1-\sqrt{-3}}{2}$, the first real, and the two latter Imaginary. Sometimes too the real root of an equation may be expressed by Imaginary quantities; as in the irreducible case of cubic equations, when the root is expressed by Cardan's rule; and that happens whenever the equation has no Imaginary roots at all; but when it has two Imaginary roots, then the only real root is expressed by that rule in an Imaginary form.

The discovery of the number of impossible or imaginary roots, in an equation, has given great trouble to algebraists: hitherto, their researches have not been attended with any great success. In a cubic equation $x^3-qx+r=0$, two roots are imaginary or not, according as $\frac{r^2}{4}-\frac{q^3}{27}$ is positive or negative. A biquadratic, $x^4+qx^2+rx+s=0$, has two impossible roots when two roots of the equation $y^3+2qy^2+\overline{q^2-4s}.y-r^2=0$, are impossible; and all its roots are impossible, when the roots of this cubic are all possible, and 2 of them negative. Sir Isaac Newton's rule, given in his Univ. Arith. is general and easily applied, but it will not always detect imaginary roots: the proof also is defective; as it does not extend to that part of the rule which respects the *number* of imaginary roots. It may, however, be thus far depended upon, that it never shews those roots, but when there are some such in the proposed equation. The reader who is desirous of being well acquainted with the nature of imaginary roots, will do well to consult Newton's, Maclaurin's, and Wood's Algebra; also Waring's Medi. Algebr. Cap. 2. where this subject is treated pretty largely.

IMAGINA'TION. *s.* (*imaginatio*, Latin.) 1. Fancy: the power of forming ideal pictures; the power of representing things absent to one's self or others (*Dennis*). 2. Conception; image of the mind; idea. 3. Contrivance; scheme (*Lam*). 4. An unsolid or fanciful opinion (*Locke*).

Imagination, considered metaphysically, is a complex power, it includes conception, or simple apprehension, which enables us to form a notion of those former objects of preception, or of knowledge, out of which we are to make a selection; abstraction, which separates the selected materials from the qualities and circumstances which are connected with them in nature, and judgment and taste direct their combination. To these powers we may add, that particular habit of association to which we give the name of fancy, as it is this which presents to our choice all the different materials which are subservient to the efforts of imagination, and which may therefore be considered as forming the groundwork of poetical genius.

None of the mental faculties exhibit such interesting and diversified phænomena, as that of the imagination. While this powerful agent is restrained within due limits, it is of the utmost service, and furnishes the most exalted delights. On the contrary, no sooner are the boundaries of the imagining faculty transgressed, than we are involuntarily led to submit to this dreadful tyrant, who is capable not only of disturbing our repose and happiness, but even of depriving his victims of life. Hence, it should be one of the most necessary maxims of intellectual nature, always to guard against this formidable power; and to regulate its reciprocal influence; so that we may maintain a

certain superiority. But, in order to evince the essential necessity of adopting this rule of practical life, and at the same time to demonstrate the danger attending the neglect of it, especially to youth, we shall quote an instance related by Professor Hufeland.

A student at Jena, about 16 years of age, having a weak and irritable nervous frame, but in other respects healthy, left his apartments during twilight, and suddenly returned with a pale, dismal countenance; assuring his companion that he was doomed to die in 36 hours, or at nine o'clock in the morning of the second day. This sudden change of a cheerful young mind naturally alarmed his friend; but no explanation was given of its cause. Every attempt at ridiculing this whimsical notion was fruitless; and he persisted in affirming that his death was certain and inevitable. A numerous circle of his fellow-students soon assembled, with a view to dispel those gloomy ideas, and to convince him of his folly, by arguments, satire, and mirth. He remained, however, unshaken in his strange conviction; being apparently inanimate in their company, and expressing his indignation at the frolics and witticisms applied to his peculiar situation. Nevertheless, it was conjectured that a calm repose during the night would produce a more favourable change in his fancy; but sleep was banished, and the approaching dissolution engrossed his attention during the nocturnal hours. Early next morning, he sent for Professor Hufeland, who found him employed in making arrangements for his burial; taking an affectionate leave of his friends; and on the point of concluding a letter to his father; in which he announced the fatal catastrophe that was speedily to happen. After examining his condition of mind and body, the Professor could discover no remarkable deviation from his usual state of health, excepting a small contracted pulse, a pale countenance, dull or drowsy eyes, and cold extremities: these symptoms, however, sufficiently indicated a general spasmodic action of the nervous system, which also exerted its influence over the mental faculties. The most serious reasoning on the subject, and all the philosophical and medical eloquence of Dr. Hufeland, had not the desired effect; and, though the student admitted that there might be no ostensible cause of death discoverable, yet this very circumstance was peculiar to his case; and such was his inexorable destiny, that he must die next morning, without any visible morbid symptoms. In this dilemma, Dr. H. proposed to treat him as a patient. Politeness induced the latter to accept of such offer, but he assured the physician, that medicines would not operate. As no time was to be lost, there being only 24 hours left for his life, Dr. H. deemed proper to direct such remedies as prove powerful excitants, in order to rouse the vital energy of his pupil, and to relieve him from his captivated fancy. Hence he prescribed a strong emetic and purgative; ordered blisters to be applied to both calves of the legs, and at the same time stimulating clysters to be administered. Quietly submitting to the Doctor's treatment, he observed, that his body being already half a corpse, all means of recovering it would be in vain. Indeed, Dr. H. was not a little surprized, on his repeating his visit in the evening, to learn that the emetic had not, or but very little, operated; and that the blisters had not even reddened the skin. Now the case became more serious; and the supposed victim of death began to triumph over the incredulity of the Professor, and his friends. Thus circumstanced, Dr. H. perceived, how deeply and destructively that mental spasm must have acted on the body, to produce a degree of insensibility from which the worst consequences might be apprehended. All the inquiries into the origin of this singular belief, had hitherto been unsuccessful. Now only, he disclosed the secret to one of his intimate friends, namely, that on the preceding evening he had met with a white figure in the passage, which nodded to him, and, in the same moment, he heard a voice exclaiming: "the day after to-morrow, at nine o'clock in the morning, thou shalt die."—He continued to settle his domestic affairs; made his will; minutely appointed his funeral; and even desired his friends to send for a clergyman; which request, however, was counteracted. Night appeared; and he began to compute the hours he had to live, till the ominous next morning: his anxiety evidently increased with the striking of every clock within hearing. Dr. H. was not without apprehension, when he recollected instances in which mere imagination had produced melancholy effects. But, as every thing depended on procrastinating, or retarding that hour in which the event was predicted; and on appeasing the tempest of a perturbed imagination, till reason had again obtained the ascendancy, he resolved upon the following happy expedient: Having a complaisant patient, who refused not to take the remedies prescribed for him (because he seemed conscious of the superior agency of his mind over that of the body), Dr. H. had recourse to laudanum, combined with the extract of hen-bane: 20 drops of the former, and two grains of the latter, were given to the youth, with such effect, that he fell into a profound sleep, from which he did not awake till eleven o'clock on the next morning. Thus, the prognosticated fatal hour elapsed; and his friends waiting to welcome the bashful patient, who had agreeably disappointed them, turned the whole affair into ridicule. The first question, however, after recovering from this artificial sleep, was, "what is the hour of the morning?" On being informed that his presages had not been verified by experience,

he assured the company that all these transactions appeared but as a dream. After that time he long enjoyed a good state of health, and was completely cured of a morbid imagination.

IMA'GINATIVE. *a.* (*imaginatif*, French.) Fantastic; full of imagination (*Taylor*).

To IMA'GINE. *v. a.* (*imaginer*, French.) 1. To fancy; to paint in the mind (*Locke*). 2. To scheme; to contrive (*Psalms*).

IMA'GINER. *s.* (from *imagine.*) One who forms ideas (*Bacon*).

IMAM, or IMAN, a minister in the Mahometan church, answering to a parish priest among us.

IMANS, in ancient geography, the largest mountain of Asia, and a part of Taurus, from which the whole of India runs off into a vast plain, resembling Egypt. Postellus thinks it is the *Sephar* of Scripture.

IMBARGO. See EMBARGO.

IMBE'CILE. *a.* (*imbecilis*, Latin.) Weak; feeble; wanting strength of either mind or body.

To IMBE'CILE. *v. a.* (from the adj. and corruptly written *embezzle.*) To weaken a stock or fortune by clandestine expences (*Taylor*).

IMBECI'LITY. *s.* (*imbecillité*, French.) Weakness; feebleness of mind or body (*Hooker*).

IMBER, in zoology. See COLYMBUS.

To IMBI'BE. *v. a.* (*imbibo*, Latin.) 1. To drink in; to draw in (*Swift*). 2. To admit into the mind (*Watts*). 3. To drench; to soak; to imbue (*Newton*).

IMBI'BER. *s.* (from *imbibe.*) That which drinks or sucks (*Arbuthnot*).

IMBIBI'TION. *s.* (*imbibition*, Fr.) The act of sucking or drinking in (*Boyle*).

To IMBI'TTER. *v. a.* (from *bitter.*) 1. To make bitter. 2. To deprive of pleasure; to make unhappy (*Addison*). 3. To exasperate.

IMBLOCA'TION, in the middle ages, the raising a heap of stones over the dead bodies of excommunicated persons.

To IMBO'DY. *v. a.* (from *body.*) 1. To condense to a body. 2. To invest with matter; to make corporeal (*Dryden*). 3. To bring together into one mass or company; to incorporate (*Shakspeare*). 4. To enclose. Improper (*Woodward*).

To IMBO'DY *v. n.* To unite into one mass; to coalesce (*Milton. Locke*).

To IMBO'IL. *v. n.* (from *boil.*) To exestuate; to effervesce: not in use (*Spenser*).

To IMBO'LDEN. *v. a.* (from *bold.*) To raise to confidence; to encourage. (*Shak.*)

To IMBO'SOM. *v. a.* (from *bosom.*) 1. To hold on the bosom; to cover fondly with the folds of one's garment (*Milton*). 2. To admit to the heart, or to affection (*Sidney*).

To IMBO'UND. *v. a.* (from *bound.*) To enclose; to shut in (*Shakspeare*).

To IMBO'W. *v. a.* (from *bow.*) To arch; to vault (*Milton*).

To IMBO'WER. *v. a.* (from *bower.*) To cover with a bower; to shelter with trees (*Thomson*).

IMBO'WMENT. *s.* (from *imbow.*) Arch; vault (*Bacon*).

To IMBRA'NGLE. *v. a.* To entangle. A low word (*Hudibras*).

IMBRICA'RIA. In botany, a genus of the class pentandria, order monogynia. Petals five; stigma capitate; capsule covered with the calyx, two-celled, many-seeded. Two species: natives of New South Wales.

IMBRI'CATE. Imbricatus. In botany. Lying over each other, like tiles on a roof. Applied to leaves and their serratures, in the bud; or, a term in foliation, to the stem, when covered with scales: tectus, ut nudus non appareat, to the calyx, as in Hieracium, Sonchus, and other Syngenesia, to the spike, having flowers so close as to press over each other. Some use tiled; a term that can hardly pass. Imbricate is also a term employed in zoology and other branches of natural history in the same sense.

IMBRICA'TION. *s.* (*imbrex*, Lat.) Concave indenture (*Derham*).

IMBRO, an island in the Grecian Archipelago, about 20 miles in circuit. It is mountainous and woody, with plenty of game. Lat. 40. 10. N. Lon. 25. 44. E.

To IMBRO'WN. *v. a.* (from *brown.*) To make brown; to darken; to obscure; to cloud (*Pope*).

To IMBRU'E. *v. a.* (from *in* and *brue.*) 1. To steep; to soak; to wet much or long (*Clarissa*). 2. To pour; to emit moisture: obsolete (*Spenser*).

To IMBRU'TE. *v. a.* (from *brute.*) To degrade to brutality (*Milton*).

To IMBRU'TE. *v. n.* To sink down to brutality (*Milton*).

To IMBU'E. *v. a.* (*imbuo*, Latin.) To tincture deep; to imbibe with any liquor or die (*Boyle*).

To IMBU'RSE. *v. a*, (*bourse*, Fr.) To stock with money.

IMI'RETTA, a country of Asia, bounded on the north by Circassia, on the east by Persia, on the south by Georgia, and on the west by Mingrelia, about 80 miles from north to south, and nearly as much from east to west; the country is poor and mountainous. The inhabitants are in general wanderers and vagabonds: it would formerly supply an army of 20,000 men, chiefly foot; at present it is but thinly peopled, partly on account of the great number of children purchased by the Turks, and an imposition on them to furnish annually fourscore young men, between 10 and 20 years of age. The real title of the prince is Meppe, though he arrogates to himself that of king of kings. There are but few towns; Kutatis seems the principal.

IMITABI'LITY. *s.* (*imitabilitas*, Latin.) The quality of being imitable (*Norris*).

I'MITABLE. *a.* (*imitabilis*, Latin.) 1.

Worthy to be imitated; deserving to be copied (*Raleigh*). 2. Possible to be imitated; within reach of imitation (*Atterbury*).

To I'MITATE. *v. a.* (*imitor*, Latin.) 1. To copy; to endeavour to resemble. (*Cowl.*) 2. To counterfeit (*Dryden*). 3. To pursue the course of a composition, so as to use parallel images and examples (*Gay*).

IMITA'TION. *s.* (*imitatio*, Latin.) 1. The act of copying; attempt to resemble. 2. That which is offered as a copy (*Dryden*). 3. A method of translating looser than paraphrase, in which modern examples and illustrations are used for ancient, or domestick for foreign (*Dryden*).

IMITA'TION, in music, a studied resemblance of melody between the several passages of the harmonical parts of a composition: a likeness in which only the motion, or the figure formed by the notes is imitated, without preserving exactness in the corresponding intervals by the rigorous rules of FUGUE and CANON.

The term imitative is appropriated to that music which is composed in imitation of the effects of some of the operations of nature, art, or human passion; as the rolling of thunder, swiftness of lightning, agitation of the sea, gurgling of streams, roaring of beasts, warbling of birds, clashing of swords, explosion of cannon; and the tones of sorrow, love, jealousy, hatred, revenge, gayety, joy, exultation or triumph. Music, when thus employed, exerts some of its sublimest energies; transports us to the very scenes it describes, or kindles the feeling whose expressions it copies. By the truth of its resemblance, it points to our imagination whatever the genius of the composer conceives, and while it submits to its imitation the most striking and interesting circumstances of nature, touches the heart, and asserts its empire over our passions (*Busby's Dict. Mus*).

This just and able description of the dominion of music over the soul, calls to our mind a well-known passage of Pope's, in which the blended powers of music and poetry are so finely pourtrayed:

"Hear how Timotheus' vary'd lays surprise,
And bid alternate passions fall and rise.
While, at each change the son of Libyan Jove
Now burns with glory, and then melts with love,
Now his fierce eyes with sparkling fury glow,
Now sighs steal out, and tears begin to flow:
Persians and Greeks like turns of nature found,
And the world's victor stood subdued by sound."

(*Essay on Criticism*).

IMITA'TION, in oratory, is an endeavour to resemble a speaker or writer in those qualities with regard to which we propose them to ourselves as patterns. The first historians among the Romans, says Cicero, were very dry and jejune, till they began to imitate the Greeks, and then they became their rivals. It is well known how closely Virgil has imitated Homer in his Æneid, Hesiod in his Georgics, and Theocritus in his Eclogues. Terence copied after Menander; and Plautus after Epicarmus, as we learn from Horace, lib. II. Ep. ad August. who himself owes many of his beauties to the Greek lyric poets. Cicero appears, from many passages in his writings, to have imitated the Greek orators. Thus Quintilian says of him, that he has expressed the strength and sublimity of Demosthenes, the copiousness of Plato, and the delicacy of Isocrates.

I'MITATIVE. *a.* (*imitativus*, Latin.) 1. Inclined to copy. 2. Aiming at resemblance. 3. Formed after some original (*Dryden*).

IMITA'TOR. *s.* (Latin; *imitateur*, Fr.) One that copies another; one that endeavours to resemble another (*Dryden*).

IMMA'CULATE. *a.* (*immaculatus*, Latin.) 1. Spotless; pure; undefiled (*Bacon*). 2. Pure; limpid (*Shakspeare*).

To IMMA'NACLE. *v. a.* (from *manacle.*) To fetter; to confine (*Milton*).

IMMA'NE. *a.* (*immanis*, Latin.) Vast; prodigiously great.

I'MMANENT. *a.* (*immanent*, Fr.) Intrinsic; inherent; internal (*South*).

IMMA'NIFEST. *a.* (*in* and *manifest.*) Not manifest; not plain: not in use (*Brown*).

IMMA'NITY. *s.* (*imanitas*, Lat.) Barbarity; savageness (*Shakspeare*).

IMMARCE'SSIBLE. *a.* (*in* and *marcesco*, Latin.) Unfading.

IMMA'RTIAL. *a.* (*in* and *martial.*) Not warlike.

To IMMA'SK. *v. a.* (*in* and *mask.*) To cover; to disguise (*Shakspeare*).

IMMATE'RIAL. *a.* (*immateriel*, French.) 1. Incorporeal; distinct from matter; void of matter (*Hooker*). 2. Unimportant; without weight; impertinent; without relation. Improper.

IMMATERIA'LITY. *s.* (from *immaterial.*) Incorporeity; distinctness from matter (*Watts*).

IMMATE'RIALLY. *ad.* (from *immaterial.*) In a manner not depending upon matter.

IMMATE'RIALIZED. *ad.* (from *in* and *materia*, Latin.) Distinct from matter; incorporeal (*Glanville*).

IMMATE'RIALNESS. *s.* (from *immaterial.*) Distinctness from matter.

IMMATE'RIATE. *a.* (*in* and *materia*, Latin.) Not consisting of matter; incorporeal; wanting body (*Bacon*).

IMMATU'RE. (*immaturus*, Lat.) 1. Not ripe. 2. Not perfect; not arrived at fulness or completion (*Dryden*). 3. Hasty; early; come to pass before the natural time (*Taylor*).

IMMATU'RELY. *ad.* Too soon; too early; before ripeness or completion.

IMMATU'RENESS. } *s.* (from *immature.*)
IMMATU'RITY. } Unripeness; incom-

pleteness; a state short of completion (*Glanville*).

IMMEABI'LITY. *s.* (*immeabilis*, Latin.) Want of power to pass (*Arbuthnot*).

IMME'ASURABLE. *a.* (*in* and *measure.*) Immense; not to be measured; indefinitely extensive (*Hooker*).

IMME'ASURABLY. *ad.* (from *immeasureable.*) Immensely; beyond all measure (*Milton*).

IMMECHA'NICAL. *a.* (*in* and *mechanical.*) Not according to the laws of mechanics (*Cheyne*).

IMME'DIACY. *s.* (from *immediate.*) Personal greatness; power of acting without dependance: not in use. (*Shak.*)

IMME'DIATE. *a.* (*immediat*, French.) 1. Being in such a state with respect to something else as that there is nothing between them; proximate (*Burnet*). 2. Not acting by second causes (*Abbot*). 3. Instant; present with regard to time. (*Shak.*)

IMME'DIATELY. *ad.* 1. Without the intervention of any other cause or event (*South*). 2. Instantly; at the time present; without delay. (*Shak.*)

IMME'DIATENESS. *s.* (from *immediate.*) 1. Presence with regard to time. 2. Exemption from second or intervening causes.

IMME'DICABLE. *a.* (*immedicabilis*, Lat.) Not to be healed; incurable (*Milton*).

IMME'MORABLE. *a.* (*immemorabilis*, Lat.) Not worth remembering.

IMMEMO'RIAL. *a.* (*immemorial*, French.) Past time of memory; so ancient that the beginning cannot be traced (*Hale*).

In our law, all the time before the reign of Edward II. is reckoned *immemorial*.

IMME'NSE. *a.* (*immense*, French.) Unlimited; unbounded; infinite (*Grew*).

IMME'NSELY. *ad.* (from *immense.*) Infinitely; without measure (*Bentley*).

IMME'NSITY. *s.* (*immensité*, French.) Unbounded greatness; infinity (*Blackmore*).

IMMENSURABI'LITY. *s.* (from *immensurable*). Impossibility to be measured.

IMME'NSURABLE. *a.* (*in* and *mensurabilis*, Latin.) Not to be measured:

IMMER, the most easterly island of all the New Hebrides in the South Sea. It lies about four leagues from *Tanna*, and is about five leagues in circuit.

To IMME'RGE. *v. a.* (*immergo*, Latin.) To put under water.

IMME'RIT. *s.* (*Immerito*, Latin.) Want of worth; want of desert (*Suckling*).

To IMME'RSE. *v. a.* (*immersus*, Latin.) 1. To put under water. 2. To sink or cover deep (*Woodward*). 3. To keep in a state of intellectual depression (*Atterbury*).

Imme'rse. *a.* (*immersus*, Lat.) Buried; covered; sunk deep (*Bacon*).

IMME'RSION. *s.* (*immersio*, Latin.) 1. The act of putting any body into fluid below the surface (*Addison*). 2. The state of sinking below the surface of a fluid. 3. The state of being overwhelmed or lost in any respect (*Atterbury*).

Imme'rsion, in astronomy, is applied to a star or planet, when so near the sun with regard to our observations, that it is enveloped and hid in the rays of that luminary. The word also denotes the moment of the beginning of a lunar eclipse; or that of a solar eclipse; or again, the beginning of an eclipse, or an occultation, of either of Jupiter's satellites.

IMMETHO'DICAL. *a.* (*in* and *methodical.*) Confused; being without regularity; being without method (*Addison*).

IMMETHO'DICALLY. *ad.* Without method; without order.

IMMI'CTION (from *immingo*, to discharge urine.) An involuntary discharge of urine.

I'MMINENCE. *s.* (from *imminent.*) Any ill impending; immediate or near danger (*Shakspeare*).

I'MMINENT. *a.* (*imminent*, French; *imminens*, Latin.) Impending; at hand; threatening (*Shakspeare*).

To IMMI'NGLE. *v. a.* (*in* and *mingle.*) To mingle; to mix; to unite (*Thomson*).

IMMINU'TION. *s.* (from *imminuo*, Lat.) Diminution; decrease (*Ray*).

IMMISCIBI'LITY. *s.* (from *immiscible.*) Incapacity of being mingled.

IMMI'SCIBLE. *a.* (*in* and *miscible.*) Not capable of being mingled (*Clarissa*).

IMMI'SSION. *s.* (*immissio*, Latin.) The act of sending in; contrary to emission.

To IMMI'T. *v. n.* (*immitto*, Latin.) To send in.

To IMMI'X. *v. a.* (*in* and *mix.*) To mingle.

IMMI'XABLE. *a.* (*in* and *mix.*) Impossible to be mingled (*Wilkins*).

IMMOBI'LITY. *s.* (*immobilité*, French.) Unmoveableness; want of motion; resistance to motion (*Arbuthnot*).

IMMO'DERATE. *a.* (*immoderatus*, Lat.) Excessive; exceeding the due mean (*Ray*).

IMMO'DERATELY. *ad.* (from *immoderate.*) In an excessive degree (*Burnet*).

IMMODERA'TION. *s.* (*immoderation*, Fr.) Want of moderation; excess.

IMMO'DEST. *a.* (*immodeste*, French.) 1. Wanting shame; wanting delicacy or chastity. (*Shak.*) 2. Unchaste; impure (*Dryden*). 3. Obscene. (*Shak.*) 4. Unreasonable; exorbitant; arrogant.

IMMO'DESTY. *s.* (*immodestie*, French.) Want of modesty; indecency (*Pope*).

To I'MMOLATE. *v. a.* (*immolo*, Latin.) 1. To sacrifice; to kill in sacrifice (*Boyle*). 2. To offer in sacrifice (*Pope*).

IMMOLA'TION. *s.* (*immolation*, French.) 1. The act of sacrificing (*Brown*). 2. A sacrifice offered (*Decay of Piety*).

IMMO'MENT. *a.* (*in* and *moment.*) Trifling; of no importance: not used. (*Shak.*)

IMMO'RAL. *a.* (*in* and *moral.*) 1. Wanting regard to the laws of natural religion. 2. Contrary to honesty; dishonest.

IMMORA'LITY. *s.* (from *immoral.*) Dishonesty; want of virtue; contrariety to virtue (*Swift*).

IMMO'RTAL. *a.* (*immortalis*, Latin.) 1. Exempt from death; being never to die (*Abbot*). 2. Never-ending; perpetual. (*Shak.*)

IMMORTAL *Flower*, in botany. See GNAPHALIUM.

IMMORTA'LITY. *s.* (from *immortal.*) Exemption from death; life never to end (*Watts*).

To IMMO'RTALIZE. *v. a.* (*immortaliser*, French.) To make immortal; to perpetuate; to exempt from death (*Davies*).

To IMMO'RTALIZE. *v. a.* To become immortal (*Pope*).

IMMO'RTALLY. *ad.* (from *immortal.*) With exemption from death; without end.

IMMO'VEABLE. *a.* (*in* and *moveable.*) 1. Not to be forced from its place (*Brown*). 2. Not liable to be carried away; real in law (*Ayliffe*). 3. Unshaken; unaffected (*Dryden*).

IMMO'VEABLY. *ad.* (from *immovable.*) In a state not to be shaken (*Atterbury*).

IMMU'NITY. *s.* (*immunité*, French. 1. Discharge from any obligation (*Hooker*). 2. Privilege; exemption from onerous duties (*Sprat*). 3. Freedom (*Dryden*).

To IMMU'RE. *v. a.* (*in* and *murus*, Latin, *emmurer*, old French.) To enclose within walls; to confine; to shut up; to imprison (*Wotton*).

IMMU'RE. *s.* (from the verb.) A wall; an enclosure; not used (*Shakspeare*).

IMMU'SICAL. *a.* (*in* and *musical.*) Inharmonious; wanting proportion of sound (*Brown*).

IMMUTABI'LITY. *s.* (*immutabilitas*, Lat.) Exemption from change; invariableness; unchangeableness (*Hooker*).

IMMU'TABLE. *a.* (*immutabilis*, Latin.) Unchangeable; invariable; unalterable (*Dryden*).

IMMU'TABLY. *ad.* (from *immutable.*) Unalterably; invariably, unchangeably) (*Boyle*).

I'MOLA, a populous town of Italy, in Romagna, with a bishop's see. It is seated on the Santerno. Lat. 44. 28. N. Long. 11. 45. E.

IMP. *s.* (*imp*, Welsh, a shoot, a sprout.) 1. A son; the offspring; progeny (*Fairfax*). 2. A subaltern devil; a puny devil (*Swift*).

To IMP. *v. a.* (*impio*, to engraff, Welsh.) To lengthen or enlarge by any thing adscititious (*Cleaveland*).

To IMPA'CT. *v. a.* (*impactus*, Latin. To drive close or hard (*Woodward*).

IMPA'CT, the simple or single action of one body upon another to put it in motion.

IMPACT, *Point of*, the point or place upon a body where it is struck by another.

To IMPA'INT. *v. a.* (*in* and *paint.*) To paint; to decorate with colours: not in use (*Shakspeare*).

To IMPA'IR. *v. a.* (*empirer*, French.) To diminish; to injure; to make worse (*Pope*).

To IMPAIR. *v. a.* To be lessened or worn out (*Spenser*).

IMPA'IR. *s.* (from the verb.) Diminution; decrease: not used (*Brown*).

IMPA'IRMENT. *s.* (from *impair.*) Diminution; injury (*Brown*).

IMPA'LED, in heraldry, when the coats of a man and his wife who is not an heiress are borne in the same escutcheon, they must be marshalled in pale; the husband's on the right side, and the wife's on the left: and this the heralds call baron in feme, two coats impaled.

If a man has had two wives, he may impale his coat in the middle between theirs; and if he has had more than two, they are to be marshalled on each side of his in their proper order.

IMPA'LPABLE. *a.* (*impalpable*, French.) Not to be perceived by touch (*Boyle*).

IMPANNELLING, in law, signifies the writing down or entering into a parchment, list, or schedule, the names of a jury summoned by the sheriff to appear for such public services as juries are employed in.

To IMPA'RADISE. *v. a.* (*imparadisare*, Italian.) To put in a place or state resembling paradise in felicity (*Donne*).

IMPA'RITY. *s.* (*imparitas*, Latin.) 1. Inequality; disproportion (*Bacon*). 2. Oddness; indivisibility into equal parts (*Brown*).

To IMPA'RK. *v. a.* (*in* and *park.*) To enclose with a park; to sever from a common.

IMPA'RLANCE, in law, a petition in court for a day to consider or advise what answer the defendant shall make to the plaintiff's action, and is the continuance of the cause till another day, or a longer time given by the court.

An imparlance is general or special; general is when it is entered in general terms, without any special clause therein; special is where the defendant desires a further day to answer. And this last imparlance is of use to plead some matters, which cannot be pleaded after a general imparlance.

It is said that imparlance was formerly from day to day, but now it is from one term to another.

To IMPA'RT. *v. a.* (*impartier*, Latin.) 1. To grant; to give (*Dryden*). 2. To make known; to show by words or tokens (*Milton*). 3. To communicate (*Shakspeare*).

IMPA'RTIAL. *a.* (*impartial*, French.) Equitable; free from regard to party; indifferent, disinterested; equal in distribution of justice; just (*Dryden*).

IMPARTIA'LITY. *s.* (*impartialité*, Fr.) Equitableness; justice; indifference (*South*).

IMPA'RTIALLY. *ad.* (from *impartial.*) Equitably; with indifferent and unbiassed judgment; justly; honestly (*South*).

IMPA'RTIBLE. *a.* (*impartible*, French.) Communicable; that may be conferred or bestowed (*Digby*).

IMPA'SSABLE. *a.* (*in* and *passable.*) Not to be passed; not admitting passage; impervious (*Raleigh*).

IMPASSIBI'LITY. *s.* (*impassibilite*, Fr.) Exemption from suffering; insusceptibility of injury from external things (*Dryden*).

IMPA'SSIBLE. *a.* (*impassible*, Fr.) Incapable of suffering; exempt from the agency of external causes; exempt from pain (*Hammond*).

IMPA'SSIBLENESS. *s.* (from *impassible.*) Impassibility; exemption from pain (*Decay of Piety*).

IMPA'SSIONED. *a.* (*in* and *passion.*) Disordered by passion (*Milton*).

IMPA'SSIVE. *a.* (*in* and *passive.*) Exempt from the agency of external causes (*Pope*).

IMPASTED. *a.* (*in* and *paste.*) Concreted as into paste: (not in use) (*Shakspeare*).

Impastation is sometimes used for a sort of mason's-work, made of stucco, or stone ground small, and wrought up again in manner of a paste.

IMPA'TIENCE. *s.* (*impatience*, French.) 1. Inability to suffer pain; rage under suffering (*Shakspeare*). 2. Vehemence of temper; heat of passion. 3. Inability to suffer delay; eagerness.

IMPA'TIENS. Noli me tangere. In botany a genus ot the class pentandria, order monogynia. Calx two-leaved, corol five petalled, irregular, with hood-shaped nectary; anthess united at the top: capsule superior, five-valved, elastic. Fourteen species, chiefly Indian plants, a few of the Cape, one of our own country: the greater part with one flowered peduncles, the remainder with many flowered peduncles. The following are chiefly worthy of notice.

1. I. Balsamina. Peduncles one-flowered, clustered; leaves lanceolate; the upper ones alternate; nutaries shorter than the flower, a native of India, the juice of which is used by the Japonese to dye their nails red; and the common balsamine of our green-houses.

2. I. Noli me tangere. Common, touch me not. Peduncles solitary, many flowered; leaves ovate; joints of the stem swelling. Found in the moist shades of England. It receives its vernacular name from the elastic force with which the capsule shoots forth its seeds when touched.

IMPA'TIENT. *a.* (*impatient*, French.) 1. Not able to endure; incapable to bear (*Pope*). 2. Furious with pain; unable to bear pain (*Dryden*). 3. Vehemently agitated by some painful passion (*Taylor*). 4. Hot; hasty (*Addison*). 5. Eager; ardently desirous; not able to endure delay (*Pope*).

IMPA'TIENTLY. *ad.* (from *impatient.*) 1. With rage, under uneasiness. 2. Passionately; ardently (*Clarendon*). 3. Eagerly; with great desire.

To IMPA'TRONIZE. *v. a.* (*impatroniser*, French.) To gain to one's self the power of any seignory: not usual (*Bacon*).

To IMPA'WN. *v. a.* (*in* and *pawn.*) To impignorate; to pawn; to give as a pledge; to pledge (*Shakspeare*).

To IMPE'ACH. *v. a.* (*empecher*, French.) 1. To hinder; to impede (*Davies*). 2. To accuse by public authority (*Addison*).

IMPE'ACH. *s.* (from the verb.) Hinderance; let; impediment (*Shakspeare*).

IMPE'ACHABLE. *a.* (from *impeach.*) Accusable; chargeable (*Grew*).

IMPE'ACHER. *s.* (from *impeach.*) An accuser; one who brings an accusation against another (*Government of the Tongue*).

IMPEACHMENT, is the accusation and prosecution of a person in parliament, for treason, or other crime and misdemeanors. An impeachment, before the Lords, by the Commons of Great Britain, is a presentment to the most high and supreme court of criminal jurisdiction, by the most solemn grand inquest of the whole kingdom. A commoner cannot be impeached before the lords for any capital offence, but only for high misdemeanors; but a peer may be impeached for any crime. The articles of impeachment are a kind of bills of indictment, found by the house of commons, and afterwards tried by the lords, who are, in cases of misdemeanors, considered not only as their own peers, but as the peers of the whole nation. By stat. 12 and 13 Wm. c. 2. no pardon under the great seal shall be pleadable to an impeachment by the Commons in parliament; but the king may pardon after conviction.

Impeachment of waste, signifies a restraint from committing of waste upon lands and tenements; and therefore he that has a lease without impeachment of waste, has by that a property or interest given him in the houses and trees, and may make waste in them without being impeached for it, that is, without being questioned, or demanded any recompence for the waste done.

To IMPE'ARL. *v. a.* (*in* and *pearl.*) 1. To form in resemblance of pearls (*Milton*). 2. To decorate as with pearls (*Digby*).

IMPECCABI'LITY. *s.* (*impeccabilité*, Fr.) Exemption from sin; exemption from failure (*Pope*).

IMPE'CCABLE. *a.* (*impeccable*, Fr.) Exempt from possibility of sin (*Hammond*).

To IMPE'DE. *v. a.* (*impedio.* Lat.) To hinder; to let; to obstruct (*Decay of Piety*).

IMPE'DIMENT. *s.* (*impedimentum*, Lat.) Hinderance; let; obstruction; opposition (*Taylor*).

To IMPE'L. *v. a.* (*impello*, Lat.) To drive on toward a point; to urge forward; to press on (*Pope*).

IMPE'LLENT. *s.* (*impellens*, Lat.) An impulsive power; a power that drives forward (*Glanville*).

To IMPE'ND. *v. n.* (*impendo*, Lat.) 1. To hang over (*Pope*). 2. To be at hand; to press nearly (*Pope*).

IMPE'NDENT. *a.* (*impendens*, Lat.) Imminent; hanging over; pressing closely (*Prior*).

IMPE'NDENCE. *s.* (from *impendent.*) The state of hanging over; near approach (*Hale*).

IMPENETRABI'LITY. *s.* (*impenetrabilité*, French.) 1. Quality of not being pierceable, or permeable (*Newton*). 2. Insusceptibility of intellectual impression.

Impenetrability, in philosophy, that property of body, whereby it cannot be pierced by another: thus, a body, which so fills a space as to exclude all others, is said to be impenetrable. Or, by impenetrability is meant the faculty which a body has of excluding every other body from the place that it occupies, in such manner that two bodies placed in contact can never occupy less space than that which they filled when they were separate. The impenetrability of solid bodies does not require to be proved, it strikes us at first view; but fluids, having their particles perfectly moveable in every direction, and yielding to the slightest pressure, their impenetrability does not manifest itself so perceptibly as that of solid bodies. Taking the air for an example: so long as this fluid is not enclosed in something, its extreme mobility causes it to admit a free passage to all bodies which are moved through it; but in this case it is properly displaced, and not penetrated; for, if the air be included within the sides of a vessel, and another body be then presented to take its place, without suffering it to escape, it will exercise its impenetrability in the same manner as solid bodies.

IMPE'NETRABLE. *a.* (*impenetrable*, Fr.) 1. Not to be pierced; not to be entered by any external force (*Dryden*). 2. Impervious; not admitting entrance (*Dryden*). 3. Not to be taught; not to be informed. 4. Not to be affected; not to be moved (*Sh.*)

IMPE'NETRABLE. *ad.* (from *impenetrable*.) With hardness to a degree incapable of impression (*Pope*).

IMPE'NITENCE. } *s.* (*impenitence*, Fr.)
IMPE'NITENCY. } Obduracy; want of remorse for crimes; final disregard of God's threatenings or mercy (*Rogers*).

IMPE'NITENT. *a.* (*impenitent*, French.) Finally negligent of the duty of repentance; obdurate (*Hammond*).

IMPE'NITENTLY. *ad.* (from *impenitent*.) Obdurately; without repentance. (*Ham.*)

IMPE'NNOUS. *a.* (*in* and *penna*, Latin.) Wanting wings (*Brown*).

I'MPERATE. *a.* (*imperatus*, Lat.) Done with consciousness; done by direction of the mind (*South. Hale*).

IMPE'RATIVE. *a.* (*imperativus*, Latin.) Commanding; expressive of command (*Clarke*).

IMPERATIVE, one of the moods of a verb, used when we would command, entreat or advise: thus, go read, take pity, be advised, are imperatives in our language. But in the learned languages this mood has a peculiar termination to distinguish it from others, as *i*, or *ito*, "go;" *lege*, or *legito*, "read," &c. and not only so, but the termination varies, according as you address one or more persons, as *audi* and *audite*; ακȣέτω, ακȣέτων, ακȣέτωσαν, &c.

IMPE'RATIVELY. *ad.* In a commanding style; authoritatively.

IMPERATOR, a title of honour, conferred on victorious Roman generals.

IMPERATO'RIA (from impero, to rule or sway, so called from its supposed powerful control over a variety of diseases.) Masterwort. In botany a genus of the class pentandria, order digynia. Fruit roundish, compressed, margined, gibbous in the middle, three ribbed; petals inflected, emarginate; umbels flat. One species only: found on the banks of our own rivers, with a striate, glabrous stem, and uniform flowers. For medical purposes the roots of this plant are imported from the Alps and Pyrenées, notwithstanding it is indigenous to this island: they have a fragrant smell, and a bitterish pungent taste. The plant, as its name imports, was formerly thought to be of singular efficacy; and its great success, it is said, caused it to be distinguished by by the name of *divinum remedium*. At present it is considered merely as an aromatic, and consequently is superseded by many of that class which possess superior qualities.

IMPERCE'PTIBLE. *a.* (*imperceptible*, Fr.) Not to be discovered; not to be perceived; small; subtile (*Dryden*).

IMPERCE'PTIBLENESS. *s.* The quality of eluding observation (*Hale*).

IMPERCE'PTIBLY. *ad.* (from *imperceptible*.) In a manner not to be perceived (*Addison*).

IMPE'RFECT. *a.* (*imperfectus*, Lat.) 1. Not complete; not absolutely finished; defective (*Boyle. Locke*). 2. Frail; not completely good.

Imperfect Number, is that whose aliquot parts, taken all together, do not make a sum that is equal to the number itself, but either exceed it, or fall short of it; being an abundant number in the former case, and a defective number in the latter. Thus, 12 is an abundant imperfect number, because the sum of all its aliquot parts, 1, 2, 3, 4, 6, makes 16, which exceeds the number 12. And 10 is a defective imperfect number, because its aliquot parts, 1, 2, 5, taken all together, make only 8, which is less than the number 10 itself.

Imperfect Flower. Imperfectus flos. In botany. Destitute either of the anther or stigma. In Rivinus and some other authors it is synonymous with apetalous of Tournefort, stamineous of Ray, and incomplete of Vaillant.

Imperfect, in music, a term applied to those chords which do not include all their accessory sounds; or, to those compound intervals which do not contain their complement of simple sounds.

IMPERFE'CTION. *s.* (*imperfection*, Fr.) Defect; failure; fault, whether physical or moral (*Addison*).

IMPE'RFECTLY. *ad.* Not completely; not fully; not without failure (*Locke*).

IMPE'RFORABLE. *a.* (*in* and *perforo*, Lat.) Not to be bored through.

IMPE'RFORATE. *a.* (*in* and *perforatus*, Lat.) Not pierced through; without a hole (*Sharp*).

IMPE'RIAL. *a.* (*imperial*, Fr. *imperialis*, Lat.) 1. Royal; possessing royalty (*Shakspeare*). 2. Betokening royalty; marking sovereignty (*Shakspeare*). 3. Belonging to an emperor or monarch; regal; royal; monarchical (*Dryden*).

Imperial Salt, among the old chemical writers, is used by some to denote the common *Sal Gemmæ*, and by others, *Sal ammoniac*.

IMPE'RIALIST. *s.* (from *imperial.*) One that belongs to an emperor (*Knolles*).

IMPE'RIOUS. *a.* (*imperieux*, French; *imperiosus*, Lat.) 1. Commanding; tyrannical; authoritative; haughty; arrogant; assuming command (*Locke*). 2. Powerful; ascendant; overbearing (*Tillotson*).

IMPE'RIOUSLY. *ad.* With arrogance of command; with insolence of authority (*Garth*).

IMPE'RIOUSNESS. *s.* (from *imperious.*) 1. Authority; air of command (*Sidney.*) 2. Arrogance of command (*Locke*).

IMPE'RISHABLE. *a.* (*imperissable*, Fr.) Not to be destroyed (*Milton*).

IMPE'RSONAL. *a.* (*impersonalis*, Latin.) Not varied according to the persons.

Impersonal Verb, in grammar, a verb to which the nominative of any certain person cannot be prefixed; or, as others define it, a verb destitute of the two first and primary persons.

IMPE'RSONALLY. *ad.* According to the manner of an impersonal verb.

IMPERSUA'SIBLE. *a.* (*in* and *persuasibilis*, Latin.) Not to be moved by persuasion (*Decay of Piety*).

IMPE'RTINENCE. } IMPE'RTINENCY. } *s.* (*impertinence*, Fr.) 1. That which is of no present weight; that which has no relation to the matter in hand (*Bacon*). 2. Folly; rambling thought (*Shakspeare*). 3. Troublesomeness; intrusion (*Wotton*). 4. Trifle; thing of no value (*Evelyn*).

IMPE'RTINENT. *a.* (*impertinent*, Fr.) 1. Of no relation to the matter in hand; of no weight (*Tillotson*). 2. Importunate; intrusive; meddling. 3. Foolish; trifling (*Pope*).

IMPE'RTINENT. *s.* A trifler; a meddler; an intruder; one who inquires or interposes where he has no right or call (*L'Estrange*).

IMPE'RTINENTLY. *ad.* (from *impertinent.*) 1. Without relation to the present matter. 2. Troublesomely; officiously; intrusively (*Addison*).

IMPERTRANSIBI'LITY. *s.* (*in* and *pertranseo*, Lat.) Impossibility to be passed through (*Hale*).

IMPE'RVIOUS. *a.* (*impervius*, Latin.) 1. Unpassable; impenetrable (*Boyle*). 2. Inaccessible (*Pope*).

IMPE'RVIOUSNESS. *s.* (from *impervious.*) The state of not admitting any passage.

IMPETI'GINES (*Impetigo, ginis*, f. from *impeto*, to infest.) An order in the class *cachexiæ* of Cullen, characterized by cachexia, deforming the external parts of the body with tumours, eruptions, &c.

IMPETI'GO (*Impetigo, ginis*, f.) This affection, as described by authors, is a disease in which several red, hard, dry, prurient spots arise in the face and neck, and sometimes all over the body, and disappear by surfuraceous or tender scales.

IMPETI'GINOUS. *a.* (from *impetigo*, Lat.) Scurfy; covered with small scabs.

I'MPETRABLE. *a.* (*impetrabilis*, from *impetro*, Lat.) Possible to be obtained.

To I'MPETRATE. *v. a.* (*impetro*, Lat.) To obtain by intreaty.

IMPETRA'TION. *s.* (*impetratio*, Latin.) The act of obtaining by prayer or intreaty (*Taylor*).

IMPETUO'SITY. *s.* (from *impetuous.*) Violence; fury; vehemence; force (*Clarendon*).

IMPE'TUOUS. *a.* (*impetueux*, Fr. from *impetus*, Lat.) 1. Violent; forcible; fierce (*Prior*). 2. Vehement of mind; passionate (*Rowe*).

IMPE'TUOUSLY. *ad.* (from *impetuous.*) Violently; vehemently (*Addison*).

IMPE'TUOUSNESS. *s.* (from *impetuous.*) Violence; fury (*Decay of Piety*).

I'MPETUS. *s.* (Latin.) Violent tendency to any point; violent effort (*Bentley*).

IMPETUS, in mechanics, is the force with which a body moves, or with which it strikes another; being equivalent to the term momentum.

IMPIE'RCEABLE. *a.* (*in* and *pierce.*) Impenetrable; not to be pierced (*Spenser*).

IMPI'ETY. *s.* (*impietas*, Latin.) 1. Irreverence to the Supreme Being; contempt of the duties of religion (*Shakspeare*). 2. Any act of wickedness; expression of irreligion (*Swift*).

To IMPI'GNORATE. *v. a.* (*in* and *pignus*, Latin.) To pawn; to pledge.

IMPIGNORA'TION. *s.* (from *impignorate.*) The act of pawning or putting to pledge.

To IMPI'NGE. *v. n.* (*impingo*, Lat.) To fall against; to strike against; to clash with (*Newton*).

To IMPI'NGUATE. *v. a.* (*in* and *pinguis*, Latin.) To fatten; to make fat (*Bacon*).

I'MPIOUS. *a.* (*impius*, Latin.) Irreligious; wicked; profane (*Forbes*).

I'MPIOUSLY. *ad.* (from *impious.*) Profanely; wickedly (*Granville*).

IMPLACABI'LITY. *s.* (from *implacable.*) Inexorableness; irreconcilable enmity; unappeasable malice.

IMPLA'CABLE. *a.* (*implacabilis*, Latin.) Not to be pacified; inexorable; malicious; constant in enmity (*Addison*).

IMPLA'CABLY. *ad.* (from *implacable.*)

With malice not to be pacified; inexorably (*Claren.*)

To IMPLA'NT. *v. a.* (*in* and *planto*, Lat.) To infix; to insert; to place; to ingraft; to settle; to set; to sow (*Sidney. Locke*).

IMPLANTA'TION. *s.* (*implantation*, Fr.) The act of setting or planting; the act of enfixing or settling.

IMPLAU'SIBLE. *a.* (*in* and *plausible.*) Not spacious; not likely to seduce or persuade (*Swift*).

I'MPLEMENT. *s.* (*implementum*, Latin.) 1. Something that fills up vacancy, or supplies wants (*Hooker*). 2. Instrument of manufacture; tools of a trade; vessels of a kitchen (*Brown*).

IMPLE'TION. *s.* (*impleo*, Lat.) The act of filling; the state of being full (*Brown*).

IMPLE'X. *a.* (*implexus*, Lat.) Intricate; entangled; complicated (*Spectator*).

To I'MPLICATE. *v. a.* (*implico*, Lat.) To entangle; to embarrass; to infold (*Boyle*).

IMPLICA'TION. *s.* (*implicatio*, Latin.) 1. Involution; entanglement (*Boyle.*) 2. Inference not expressed, but tacitly connected (*Ayliffe*).

IMPLI'CIT. *a.* (*implicitus*, Lat.) 1. Entangled; infolded; complicated (*Pope*). 2. Inferred; tacitly comprised; not expressed (*Smalridge*). 3. Resting upon another; connected with another over which that which is connected to it has no power; trusting with reserve or examination (*Denham*).

IMPLI'CITLY. *ad.* (from *implicit.*) 1. By inference comprised, though not expressed (*Bentley*). 2. By connexion with something else; dependently; with unreserved confidence or obedience (*Rogers*).

To IMPLO'RE. *v. a.* (*imploro*, Latin.) 1. To call upon in supplication; to solicit (*Pope*). 2. To ask; to beg (*Shakspeare*).

IMPLO'RE. *s.* (from the verb.) The act of begging; intreaty: not in use (*Spenser.*)

IMPLO'RER. *s.* (from *implore.*) Solicitor (*Shakspeare.*)

IMPLU'MED. *a.* (*implumis*, Lat.) Without feathers.

To IMPLY'. *v. a.* (*implico*, Lat.) 1. To infold; to cover; to intangle; not in use (*Spenser*). 2. To involve or comprise as a consequence or concomitant (*Dryden*).

To IMPOI'SON. *v. a.* (*empoisoner*, Fr.) 1. To corrupt with poison (*Shakspeare*). 2. To kill with poison (*Shakspeare*).

IMPO'LARILY. *ad.* (*in* and *polar.*) Not according to the direction of the poles (*Brown*).

IMPOLI'TICAL. } IMPO'LITIC. } *a.* (*in* and *politic.*) Imprudent; indiscreet; void of art or forecast (*Hooker*).

IMPOLI'TICALLY. } IMPO'LITICLY. } *ad.* Without art or forecast.

IMPONDERABLE SUBSTANCES, in philosophy, those which are either really or apparently without weight; those whose weight is so extremely trifling, if it exist at all, that it cannot be measured; such are caloric, the electric, and magnetic fluids, and light.

IMPO'NDEROUS. *a.* (*in* and *ponderous.*) Void of perceptible weight (*Brown*).

IMPORO'SITY. *s.* (*in* and *porous.*) Absence of interstices; compactness; closeness (*Bacon*).

IMPO'ROUS. *a.* (*in* and *porous.*) Free from pores; free from vacuities or interstices; close of texture; completely solid (*Ray*).

To IMPO'RT. *v. a.* (*importo*, Latin.) 1. To carry into any country from abroad: opposed to export (*Pope*). 2. To imply; to infer (*Bacon*). 3. To produce in consequence (*Shakspeare*). 4. (*importe*, Fr.) To be of moment (*Dryden*).

IMPO'RT. *s.* (from the verb.) 1. Importance; moment; consequence (*Shaks.*) 2. Tendency (*Boyle*). 3. Any thing brought from abroad.

IMPO'RTABLE. *a.* (*in* and *portable.*) Unsupportable; not to be endured (*Spenser*).

IMPO'RTANCE. *s.* (French.) 1. Thing imported or implied (*Shakspeare*). 2. Matter; subject; not in use (*Shakspeare*). 3. Consequence; moment (*Pope*). 4. Importunity. Not proper (*Shakspeare*).

IMPO'RTANT. *a.* (*important*, French.) 1. Momentous; weighty; of great consequence (*Wotton*). 2. Momentous; forcible; of great efficacy. 3. Importunate. Not proper (*Shakspeare*).

IMPORTA'TION. *s.* (from *import.*) The act or practice of importing, or bringing into a country from abroad (*Addison*).

The following statement of the total value of the imports of England, in the year 1354, furnishes a curious comparison with their present magnitude:

	£.	s.	d.
1831 fine cloths, at 6l. per cloth, which, with the customs, come to	11,083	12	0
397¾ hundred weight of wax, at 40s. per hundred weight, which, with the customs, come to	815	7	5
1829½ tons of wine, at 40s. per ton, which, with the customs, come to	3,841	19	0
Linen-cloth, mercery, grocery, and all other wares	22,943	6	10
On which the customs were ..	285	18	3
Total........	£38,970	3	6

See EXPORTATION.

IMPO'RTER. *s.* (from *import.*) One that brings in from abroad (*Swift*).

IMPO'RTLESS. *a.* (from *import.*) Of no moment or consequence (*Shakspeare*).

IMPO'RTUNATE. *a.* (*importunus*, Lat.) Unseasonable and incessant in solicitations; not to be repulsed (*Smalridge*).

IMPO'RTUNATELY. *ad.* With incessant solicitations; pertinaciously in petition (*Duppa*).

IMPO'RTUNATENESS. *s.* (from *importunate.*) Incessant solicitation (*Sidney*).

To IMPORTU'NE. *v. a.* (*importunus*, Lat.) 1. To disturb by reiteration of the same request. 2. To tease; to harass with slight vexation perpetually recurring; to molest (*Swift*).

IMPORTU'NE. *a.* (*importunus*, Lat.) 1. Constantly recurring; troublesome by frequency (*Bacon*). 2. Troublesome; vexatious (*Hammond*). 3. Unseasonable; coming, asking, or happening at a wrong time (*Milton*).

IMPORTU'NELY. *ad.* 1. Troublesomely; incessantly (*Spenser*). 2. Unseasonably; improperly (*Sanderson*).

IMPORTU'NITY. *s.* (*importunitas*, Lat.) Incessant solicitation (*Knolles*).

To IMPO'SE. *v. a.* (*imposer*, French.) 1. To lay on as a burden or penalty (*Shaks.*) 2. To enjoin as a duty or law (*Waller*). 3. To fix on; to impute to (*Brown*). 4. To obtrude fallaciously (*Dryden*). 5. *To* Impose *on.* To put a cheat on; to deceive (*Locke*). 6. (Among printers.) To put the pages on the stone, and fit on the chase, in order to carry the form to press.

IMPO'SE. *s.* (from the verb.) Command; injunction: not in use (*Shakspeare*).

IMPO'SEABLE. *a.* (from *impose.*) To be laid as obligatory on any body (*Hammond*).

IMPO'SER. *s.* (from *impose.*) One who enjoins as a law; one who lays any thing on another as a hardship (*Walton*).

IMPOSI'TION. *s.* (*imposition*, French.) 1. The act of laying any thing on another. 2. The act of annexing (*Boyle*). 3. Injunction of any thing as a law or duty (*Shakspeare. Milton*). 4. Constraint; oppression (*Watts*). 5. Cheat; fallacy; imposture. 6. A supernumerary exercise enjoined scholars as a punishment.

Imposition of hands, an ecclesiastical action by which a bishop lays his hand on the head of a person, in ordination, confirmation, or in uttering a blessing. This practice is also frequently observed by some denominations of dissenters at the ordination of their ministers, when all the ministers present place their hands on the head of him whom they are ordaining, while one of them prays for a blessing on him and his future labours. This some of them retain as an ancient practice, justified by the example of the apostles, when no extraordinary gifts are conveyed. However, they are not agreed as to the propriety of this ceremony; nor do they consider it as an essential part of ordination. Imposition of hands was a Jewish ceremony, introduced not by any divine authority, but by custom; it being the practice among those people, whenever they prayed to God for any person, to lay their hands on his head. Our Saviour observed the same custom, both when he conferred his blessing on children and when he cured the sick; adding prayer to the ceremony. The apostles likewise laid hands on those upon whom they bestowed the Holy Ghost. The priests observed the same custom when any one was received into their body. And the apostles themselves underwent the imposition of hands afresh every time they entered upon any new design. In the ancient church, imposition of hands was even practised on persons when they married, which custom the Abyssinians still observe.

IMPOSSIBI'LITY. *s.* (*impossibilité*, Fr.) 1. Impracticability; the state of being not feasible (*Whitgift. Rogers*). 2. That which cannot be done (*Cowley*).

IMPOSSIBLE, that which is not possible, or which cannot be done or effected. A proposition is said to be impossible, when it contains two ideas which mutually destroy each other, and which can neither be conceived nor united together. Thus it is impossible that a circle should be a square; because we conceive clearly that squareness and roundness destroy each other by the contrariety of their figure. There are two kinds of impossibilities, physical and moral. Physical impossibility is that which is contrary to the law of nature. A thing is morally impossible, when of its own nature it is possible, but yet is attended with such difficulties, as that, all things considered, it appears impossible. Thus it is morally impossible that all men should be virtuous; or that a man should throw the same number with three dice a hundred times successively. A thing which is impossible in law, is the same with a thing impossible in nature: and if any thing in a bond or deed be impossible to be done, such deed, &c. is void. 21 Car. I.

Impossible Quantity or Root, in Algebra. See Imaginary.

IMPOST. *s.* (*impost*, French.) A tax; a toll; a custom paid.

IMPOSTS, in architecture, the capitals of pillars which support arches; or the parts of piers from which arches spring.

IMPOSTHUME. See Abscess and Surgery.

To IMPO'STHUMATE. *v. n.* (from *imposthume.*) To form an abscess; to gather; to form a cyst or bag containing matter (*Arbuthnot*).

To IMPO'STHUMATE. *v. a.* To afflict with an imposthume (*Decay of Piety*).

IMPOSTHUMA'TION. *s.* (from *imposthumate.*) The act of forming an imposthume; the state in which an imposthume is formed.

IMPO'STHUME. *s.* (formed by corruption from *aposteme*, an abscess.) A collection of purulent matter in a bag or cyst (*Shakspeare*).

IMPO'STOR. *s.* (*imposteur*, French.) One who cheats by a fictitious character (*South*).

IMPO'STURE. *s.* (*imposture*, French.) Cheat; fraud; supposititiousness (*South*).

I'MPOTENCE. } *s.* (*impotentia*, Latin).
I'MPOTENCY. }
1. Want of power; inability; imbecility;

weakness (*Bentley*). 2. Ungovernableness of passion (*Milton*). 3. Incapacity of propagation (*Pope*).

Impotency is a term more particularly used for an inability to coition. Impotence with respect to men is the same as sterility in women, that is, an inability of propagating the species. There are many causes of impotence: as, a natural defect in the organs of generation, which seldom admits of a cure: accidents or diseases; and in such cases the impotence may or may not be remedied, according to these are curable or otherwise. The most common causes, and almost the only, are, early and immoderate venery, or the practice of masturbation in youth. We have instances, however, of unfitness for generation in men by an impediment to the ejection of the semen in coition, from a wrong direction which the orifice at the verumontanum got, whereby the seed was thrown up into the bladder. M. Petit cured one patient under such a difficulty of emission, by making an incision like to that commonly made in the great operation for the stone.

On this subject we have some curious and original observations by the late Mr. John Hunter in his Treatise on the Venereal Disease, to which the reader is referred.

I'MPOTENT. *a.* (*impotent*, French.) 1. Weak; feeble; wanting force; wanting power (*Hooker*). 2. Disabled by nature or disease (*Shakspeare*). 3. Without power of restraint (*Dryden*). 4. Without power of propagation (*Tatler*).

I'MPOTENTLY. *ad.* Without power (*Pope*).

To IMPOU'ND. *v. a.* (*in* and *pound*) 1. To enclose as in a pound; to shut in; to confine (*Bacon*). 2. To shut up in a pinfold (*Dryden*).

IMPRA'CTICABLE. *a.* (*impracticable*, French.) 1. Not to be performed; unfeasible; impossible (*Rogers*). 2. Untractable; unmanageable (*Rowe*).

IMPRA'CTICABLENESS. *s.* 1. Impossibility (*Swift*). 2. Untractableness; stubbornness.

To I'MPRECATE. *v. a.* (*imprecor*, Latin.) To call for evil upon himself or others.

IMPRECA'TION. *s.* (*imprecatio*, Latin.) Curse; prayer by which any evil is wished (*Pope*).

I'MPRECATORY. *a.* (from *imprecate*.) Containing wishes of evil.

To IMPRE'GN. *v. a.* (*in* and *prægno*, Lat.) To fill with young; to fill with any matter or quality; to make pregnant (*Milton*).

IMPRE'GNABLE. *a.* (*imprenable*, Fr.) 1. Not to be stormed; not to be taken (*Milton*). 2. Unshaken; unmoved; unaffected (*South*).

IMPRE'GNABLY. *ad.* (from *impregnable*.) In such a manner as to defy force or hostility (*Sandys*).

To IMPRE'GNATE. *v. a.* (*in* and *prægno*, Latin.) 1. To fill with young; to make prolific (*Brown*). 2. (*impregner*, French.) To fill; to saturate.

IMPREGNA'TION. *s.* (from *impregnate*.) 1. The act of making prolific; fecundation. See Conception and Generation. 2. That with which any thing is impregnated (*Derham*). 3. Saturation (*Ainsworth*).

IMPREJU'DICATE. *a.* (*in*, *præ*, and *judico*, Latin.) Unprejudiced; not prepossessed; impartial (*Brown*).

IMPREPARA'TION. *s.* (*in* and *preparation*). Unpreparedness; want of preparation (*Hooker*).

To IMPRE'SS. *v. a.* (*impressum*, Latin.) 1. To print by pressure; to stamp (*Derham*). 2. To fix deep (*Watts*). 3. To mark, as impressed by a stamp (*Spenser*). 4. To force into military service (*Shakspeare*).

IMPRE'SS. *s.* (from the verb.) 1. Mark made by pressure (*Woodward*). 2. Effects of one substance on another (*Glanvel*). 3. Mark of distinction; stamp (*South*). 4. Device; motto (*Milton*). 5. Act of forcing into service (*Shakspeare*).

IMPRE'SSIBLE. *a.* (*in* and *pressum*, Lat.) What may be impressed (*Bacon*).

IMPRESSING men. The power of impressing seamen for the sea service, by the king's commission, has been a matter of some dispute, and submitted to with great reluctance, though it has very learnedly been argued by sir Michael Forster, that the practice of impressing, and granting power to the admiralty for that purpose, is of very ancient date, and has been continued by a regular series of precedents to the present time, whence he concludes it to be part of the common law. The difficulty arises hence, that no statute has expressly declared this power to be in the crown, though many of them very strongly imply it. The stat. 2. R. II. c. 4. speaks of mariners being arrested and retained for the king's service, as of a thing well known and practised without dispute, and provides a remedy against the running away.

By stat. 2 and 3 P. and M. c. 16, if any waterman who uses the river Thames, shall hide himself during the execution of any commission for pressing for his majesty's service, he is liable to heavy penalties. By stat. 5 Eliz. c. 6. no fisherman shall be taken by the queen's commission to serve as a mariner; but the commission shall be first brought to two justices of the peace, inhabiting near the sea-coast where the mariners are to be taken, to the intent that the justices may choose out and return such a number of able-bodied men as in the commission are contained to serve her majesty. And by stat. 7 and 8 W. c. 21.: 2 Anne, c. 6.: 4 and 5 Anne, c. 19.: 13 Geo. II. c. 17.: especially protections are allowed to seamen in particular circumstances, to prevent them from being impressed. All which certainly imply a power of impressing to reside somewhere: and if any where, it must, from the spirit of our constitution,

as well as from the frequent mention of the king's commission, reside in the crown alone. 1 Black. 419.

The Liverymen of London claim an exemption from being pressed; but by a late decision of the Court of King's Bench, this exemption is denied. Landmen, entering into the merchant service, and apprentices, are exempt for two years from the impress, and all apprentices to the sea-service under eighteen.

IMPRE'SSION. *s.* (*impressio*, Latin.) 1. The act of pressing one body upon another (*Locke*). 2. Mark made by pressure; stamp (*Shakspeare*). Image fixed in the mind (*Swift*). 4. Operation; influence (*Clarendon*). 5. Effect of an attack (*Wotton*). 6. Edition; number printed at once; one course of printing (*Dryden*).

IMPRE'SSURE. *s.* (from *impress*). The mark made by pressure; the dint; the impression (*Shakspeare*).

To IMPRI'NT. *v. a.* (*imprimer*, French.) 1. To mark upon any substance by pressure (*Holder. South*). 2. To stamp words upon paper by the use of types. 3. To fix on the mind or memory (*Locke*).

To IMPRI'SON. *v. a.* (*emprisonner*, Fr.) To shut up; to confine; to keep from liberty (*Dryden*).

IMPRI'SONMENT. *s.* (*emprisonnement*, French.) Confinement; clausure; state of being shut in prison (*Watts*).

Imprisonment, is the restraint of a man's liberty under the custody of another, and extends not only to a gaol, but a house, stocks, or where a man is held in the street, or any other place: for, in all these cases, the party so restrained is said to be a prisoner so long as he has not his liberty freely to go about his business as at other times.

None shall be imprisoned but by the lawful judgment of his peers, or by the law of the land. Magna Charta.

Imprisonment, false. To constitute the injury of false imprisonment, two points are necessary: the detention of the person, and the unlawfulness of such detention. Every confinement of the person is imprisonment, whether it is in a common prison, or in a private house, or in the stocks, or even by forcibly detaining one in the streets. 2 Inst. 589. Unlawful or false imprisonment consists in such confinement or detention without sufficient authority: which authority may arise either from some process from the courts of justice; or from some warrant from a legal power to commit, under his hand and seal, and expressing the cause of such commitment; or from some other special cause warranted, for the necessity of the thing, either by common law or act of parliament: such as the arresting of a felon by a private person without warrant, the impressing of mariners for the public service, or the apprehending of waggoners for misbehaviour in the public highways. False imprisonment also may arise by executing a lawful warrant or process at an unlawful time, as on a Sunday; or in a place privileged from arrests, as in the verge of the king's court. This is the injury. The remedy is of two sorts; the one removing the injury, the other making satisfaction for it.

The means of removing the actual injury of false imprisonment are four-fold, 1. By writ of Mainprize. 2. By writ De Odio et Atia. 3. By writ De Homine Replegiando. 4. By writ of Habeas Corpus. See those articles.

The satisfactory remedy for this injury for false imprisonment is by an action of trespass vi et armis, usually called an action of false imprisonment; which is generally, and almost unavoidably, accompanied with a charge of assault and battery also: and therein the party shall recover damages for the injuries he has received; and also the defendent is, as for all other injuries committed with force, or vi et armis, liable to pay a fine to the king for the violation of the public peace.

IMPROBABI'LITY. *s.* (from *improbable.*) Unlikelihood; difficulty to be relieved (*Dryden*).

IMPRO'BABLE. *a.* (*improbable*, French.) Unlikely; incredible (*Addison*).

IMPRO'BABLY. *ad.* (from *improbable.*) 1. Without likelihood. 2. In a manner not to be approved: obsolete (*Boyle*).

To IMPROBATE. *v. a.* (*in* and *probo*, Lat.) Not to approve (*Ainsworth*).

IMPROBA'TION. *s.* (*improbatio*, Lat.) Act of disallowing (*Ainsworth*).

IMPRO'BITY. *s.* (*improbitus*, Latin.) Want of honesty; dishonesty; baseness (*Hooker*).

To IMPROLI'FICATE. *v. a.* (*in* and *prolific.*) To impregnate; to fecundate (*Brown*).

IMPROMPTU', or Inpromptu, a Latin word frequently used among the French, and sometimes in England, to signify a piece made off hand, or *extempore*, without any previous meditation, by mere force and liveliness of imagination.

IMPRO'PER. *a.* (*impropre*, French.) 1. Not well adapted; unqualified (*Burnet*). 2. Unfit; not conducive to the right end (*Arb.*) 3. Not just; not accurate (*Dryden*).

Improper *Fraction*, in arithmetic, is one whose numerator is either equal to, or greater than, its denominator, as $\frac{4}{4}$ or $\frac{6}{5}$.

IMPRO'PERLY. *ad.* 1. Not fitly; incongruously. 2. Not justly; not accur atel (*Dryden*).

To IMPRO'PRIATE. *v. a.* (*in* and *proprius*, Latin.) 1. To convert to private use; to seize to himself (*Bacon*). 2. To put the possessions of the church into the hands of laics (*Spelman*).

IMPROPRIA'TION. *s.* (from *impropriate.*) An impropriation is properly so called when the church land is in the hand of a layman; and an appropriation is, when it is

in the hands of a bishop, college, or religious house (*Ayliffe*).

IMPROPRIA'TOR. *s.* (from *impropriate.*) A layman that has the possession of the lands of the church (*Ayliffe*).

IMPROPRI'ETY. *s.* (*impropriété*, Fr.) Unfitness; unsuitableness; inaccuracy; want of justness (*Brown. Swift*).

IMPRO'SPEROUS. *a.* (*in* and *prosperous.*) Unhappy; unfortunate; not successful (*Dry.*)

IMPRO'SPEROUSLY. *ad.* Unhappily; unsuccessfully; with ill fortune (*Boyle*).

IMPRO'VEABLE. *a.* (from *improve.*) Capable of being advanced from a good to a better state; capable of melioration (*Grew*).

IMPRO'VEABLENESS. *s.* (from *improveable.*) Capableness of being made better.

IMPRO'VEABLY. *ad.* (from *improveable.*) In a manner that admits of melioration.

To IMPRO'VE. *v. a.* (*in* and *probus*, Lat.) 1. To advance any thing nearer to perfection; to raise from good to better (*Pope*). 2. To disprove: not used (*Whitgift*).

To IMPRO'VE. *v. n.* To advance in goodness (*Atterbury*).

IMPRO'VEMENT. *s.* (from *improve.*) 1. Melioration; advancement of any thing from good to better (*Tillotson*). 2. Act of improving (*Addison*). 3. Progress from good to better (*Addison*). 4. Instruction; edification (*South*). 5. Effect of melioration (*South*).

IMPRO'VER. *s.* (from *improve.*) 1. One that makes himself or any thing else better (*Clarendon. Pope*). 2. Any thing that meliorates (*Mortimer*).

IMPROVI'DED. *a.* (*improvisus*, Latin.) Unforeseen; unexpected; unprovided against (*Spencer*).

IMPRO'VIDENCE. *s.* (from *improvident.*) Want of forethought; want of caution (*Hale*).

IMPRO'VIDENT. *a.* (*improvidus*, Latin.) Wanting forecast; wanting care to provide (*Clarendon*).

IMPRO'VIDENTLY. *ad.* Without forethought; without care (*Donne*).

IMPROVI'SION. *s.* (*in* and *provision.*) Want of forethought (*Brown*).

IMPRU'DENCE. *s.* (*imprudence*, French, *imprudentia*, Latin.) Want of prudence; indiscretion; negligence; inattention to interest.

IMPRU'DENT. *a.* (*imprudent*, French, *imprudens*, Latin.) Wanting prudence; injudicious; indiscreet; negligent (*Tillotson*).

I'MPUDENCE. } *s.* (*impudence*, Fr. *impu-*
I'MPUDENCY. } *dentia*, Latin.)
Shamelessness; immodesty (*Shak. K. Charles*).

I'MPUDENT. *a.* (*impudent*, French, *impudens*, Latin.) 1. Shameless; wanting modesty (*Shakspeare*). 2. Unchaste; immodest.

I'MPUDENTLY. *ad.* Shamelessly; without modesty (*Sandys*).

To IMPU'GN. *v. a.* (*impugner*, French, *impugno*, Latin.) To attack; to assault by law or argument (*South*).

IMPU'GNER. *s.* (from *impugn.*) One that attacks or invades.

IMPUI'SSANCE. *s.* (French.) Impotence; inability; weakness; feebleness (*Bacon*).

I'MPULSE. *s.* (*impulsus*, Latin.) 1. Communicated force; the effect of one body acting upon another (*South*). 2. Influence acting upon the mind; motive; idea impressed (*Locke*). 3. Hostile impression (*Prior*).

IMPU'LSION. *s.* (*impulsion*, French.) 1. The agency of body in motion upon body *Bacon*). 2. Influence operating upon the mind (*Milton*).

IMPULSION, is the term employed in the language of mechanical philosophy, for expressing a supposed peculiar exertion of the powers of body, by which a moving body changes the motion of another body by hitting or striking it. The plainest case of this action is when a body in motion hits another body at rest, and puts it in motion by the stroke. The body thus put in motion is said to be impelled by the other; and this way of producing motion is called impulsion, to distinguish it from pression, thrusting, or protrusion, by which we push a body from its place without striking it. The term has been gradually extended to every change of motion occasioned by the collision of bodies.

Galileo, to whom we are indebted for the first discoveries in the doctrine of free motions, was also the first who attempted to bring impulsion within the pale of mathematical discusion. This he attempted, by endeavouring to state what is the force or energy of a body in motion. The very obscure reflections of Aristotle on this subject only served to make the study more intricate and abstruse. Galileo's reflections on it are void of that luminous perspicuity which is seen in all his other writings, and do not appear to have satisfied his own mind. He has recourse to an experiment, in order to discover what pressure was excited by impulsion. A weight was made to fall on the scale of a balance, the other arm of which was loaded with a considerable weight; and the force of the blow was estimated by the weight which the blow could thus start from the ground. The results had a certain regularity, by which some analogy was observed between the weights thus started and the velocity of the impulse; but the anomalies were great, and the analogy was singular and puzzling; it led to many intricate discussions, and science advanced but slowly.

At last the three eminent mathematicians, Dr. Wallis, Sir Christopher Wren, and Huyghens, about the same time, and unknown to each other, discovered the simple and beautiful laws of collision, and communicated them to the Royal Society of London in 1668 (Phil. Trans. No. 43—46.) Sir Christopher Wren also invented a beautiful method of demonstating the doctrine by experiment. The bodies which were made to strike each other were suspended by threads of equal length, so as to touch each other when at rest. When removed from this their vertical situation, and then let go, they struck when arrived at the lowest points of their respective circles, and their velocities were proportional to the chords of the arches through which they had descended. Their velocities, after the stroke, were measured, in like manner, by the chords of their arches of ascent. The experiment corresponded precisely with the theoretical doctrine.

Soon after the time in which these philosophers lived, others entered minutely into refined considerations connected with this subject; and thus

in a short time it was affirmed by many that impulse was the sole cause of motion; the cause of any motion being hence thought sufficiently explained when it could be referred to impulse. But this is all the result of ingenious speculation pushed farther than it can be attended by conviction. There are thousands of instances of moving forces where we cannot conceive how they can be produced by the impulse of a body already in motion. There appear to be many moving powers in nature, independent of, and inexplicable by, any previous motion; these may be brought into action, or occasions may be afforded for their action, in a variety of ways. The mere will of an animal brings some of them into action in the internal procedure of muscular motion; mere vicinity brings into action powers which are almost irresistible, and which produce most violent motions. Thus a little aquafortis poured on powdered chalk contained in a bumbshell, will burst it, throwing the fragments to a great distance. A spark of fire brings them into action in a mass of gunpowder, or other combustibles. And here it deserves remark, that the greater the mass is to which the spark is applied, the more violent is the motion produced. It would be just the contrary, if the motion were produced by impulse. For in all cases of impulsion, the velocity is inversely proportional to the matter that is moved. When a spring is bent, and the two ends are kept together by a thread, a pressure is excited, which continues to act as long as the thread remains entire. What contrivance of impelling fluid will explain this, or give us any conception of the total cessation of this pressure, when the thread is broken, and the spring regains its quiescent form?

Our notions of solidity or impenetrability (a name still indicating an obstacle to pressure), gives us no clearer conception of the productions of motion by impulsion than pressure does; for it is the same, or indicated by the same sensations.

The question now seems to be reduced to this—Since the strongest pressure of a quiescent body does not produce motion, or excite that kind of pressure which is the immediate cause of motion, while a body in motion, exciting but a very moderate pressure (as may be seen by the trifling compression or dimpling), produces a very considerable motion, how is the previous motion conducive to this purpose? The answer usually given is this: a body in motion (by whatever cause), preserves in that motion by the inherent force; when it arrives at another body, it cannot proceed without displacing that body. The nature of the inherent force is such that none of it is lost, and that a portion of it passes into the other body, and the two bodies instantly proceed with the same quantity of motion that was in the impelling body alone. This is an exact enough narrative of the general fact, but it gives no great explanation of it. If the impelling body perseveres in its motion by means of its inherent force, that force is exerted in performing its office, and can do no more. The impelled body seems as much to possess an inherent force; for the same marks and evidences of pressure on both sides are observed in the collision. If both bodies are soft or compressible, both are dimpled or compressed. We are as much entitled, therefore, to say, that part of the force by which it perseveres at rest, passes into the other body. But the rest, or quiescence of a body, is always the same; yet what passes into the impelling body is different, according to its previous velocity. We can form no conception how the half of the inherent force of the impelling body is expended by every particle, passes through the points of contact, and is distributed among the particles of the impelled body; nay, we cannot conceive this halving, or any other partition of the force. Is it a thing *sui generis*, made up of its parts, which can be detached from each other, as the particles of salt may be, and really are, when a quantity of fresh water is put in to contact with a quantity of brine? We have no clear conception of this; and therefore this is no elucidation of the matter, although it may be an exact statement of the visible fact.

Let us take the simplest possible case, and suppose only two particles of matter, one of which is at rest, and the other moves up to it at the rate of two feet per second. The event is supposed to be as follows: in the instant of contact, the two particles proceed with half of the former velocity. Now this instant of time, and this precise point of space, in which the contact is made, is not a part of either the time or space before collision, or of those after collision; it is the boundary between both; it is the last instant of the former time, and the first instant of the latter time; it belongs to both, and may be said to be in both. What is the state or condition of the impelling particle in this instant? In virtue of the previous motion, it has the determination, or the force, or the power, to move at the rate of two feet per second; but, in virtue of the motion after collision, it has the determination or power of moving at the rate of one foot per second. In one and the same instant, therefore, it has two determinations, or only one of them, or neither of them. And it may, in like manner, be said of the impelled body, that, in that instant, it was both at rest, and moving at the rate of one foot per second. This seems inconceivable or absurd.

It is not perhaps very clear and demonstrable, nor is it intuitively certain, that the moving body or particle must displace the other at all. All that we know is, that matter is moveable, and that causes of this motion exist in nature. When they have produced this motion, they have performed their task, and the motion is their complete effect: the particle continues in this condition for ever, unless it be changed for some cause; but we do not see any thing in this condition that enables us to say what causes are competent to this change, and what are not. Is it either intuitive or demonstrable, that the mere existence of another particle is not a sufficient or adequate cause? Is it certain that the arrival at another particle is an adequate cause? or can we prove that this will not stop it altogether? The only conclusion that we can draw with any confidence is, that "two particles, or two equal bodies, meeting with equal velocities, in opposite directions, will stop." But our only reason for this conclusion is, that we cannot assign an adequate reason why either should prevail. But this form of argument never carries luminous conviction, nor does it even give a decision at all, unless a number of cases can be specified which include every possible result. This can hardly be affirmed in the present case.

We apprehend that the next case, in point of simplicity, has still less intuitive or deductive evidence; namely, when bodies meet in opposite directions with equal quantities of motion. It is

by no means easy, if it be at all possible, to show that they must stop. The proof proceeds on some notion of the manner in which the impulsion, exerted on one particle, or on a few of each body, namely, those which come into contact, is distributed among all the particles. A material atom is moved only when a moving force acts on it, and each atom gets a motion precisely commensurate to the force which actuates it. Now, it is so far from being clear, how a force impressed on one particle of a solid body occasions an equal portion of itself to pass into every particle of that body, and impel it forward in the same direction, that the very authors who assume the present proposition as an elementary truth, claim no small honour for having determined with precision the moving forces that are exerted on each particle, and the circumstances that are necessary for producing an equal progressive motion in each.

The opinion that impulsion is the sole cause of motion is unwarranted. We see that the phenomena of impulsion are brought about by the immediate operation of pressure; and we see numberless instances of pressure, in which we cannot find the smallest trace of impulsion. It is therefore a most violent and unwarranted opinion, which ascribes to repeated unperceived impulsions all those solicitations to motion by which, or in consequence of which, the motions of bodies are effected by distant bodies, or bear an evident relation to the situation and distance of other bodies; as in the examples of planetary deflection, terrestrial gravitation, magnetical and electrical deflections, and the like. There is nothing in the phenomenon of the pressure of gravity that seems to make impulsion more necessary or more probable than in the pressure of elasticity, whether that of a spring or of an expansive fluid. The admission of an unperceived fluid to effect those impulsions is quite unwarranted, and the explanation is therefore unphilosophical, even although we should perceive intuitively that an atom in motion will put another into motion by hitting it. We apprehend that this cannot be affirmed with any clear perception of its truth.

On the whole, therefore, we must ascribe that contented aquiescence in the explanations of gravitation, and other attractions and repulsions, by means of impulse (if the acquiescence be not pretended), to the frequency and familiarity of impulsion, and perhaps to the personal share and interest we have in this mode of producing motion.

There are many cases of doubtful contact. Every person has observed the brilliant dew-drops lying on the leaves of plants. Every person acquainted with Newton's optical discoveries, must be convinced that the dewdrop is not in mathematical contact with the leaf; if it were, it could have no brilliancy. Most persons have observed the rain drops of a summer shower fall on the surface of water, and roll about for a few seconds, exhibiting the greatest brilliancy. They cannot therefore be in mathematical contact with the water. There must be a small distance between them, and therefore some force which keeps them asunder, and carries the weight, that is, counteracts the downward pressure of the raindrop. In Newton's celebrated optical experiment in which coloured rings are formed by the pressure of convex lenses one upon another, it is demonstrable that whatever be the pressure with which the glasses are brought together, they do not actually touch; yet they impel each other. And other optical facts serve to confirm the same truth. The inference to be drawn from them is remarkable and important. It is, that we have no authority for affirming that the changes of motion by the collision of bodies is brought about by absolute contact in any instance whatever. The glasses are not in contact where there is vivid reflection; and we have no proof that they are in contact in the black spot, however great the compression may be.

It is hardly necessary now to say, that all attempts to explain gravitation, or magnetism, or electricity, or any such apparent action at a distance by the impulsions of an unseen fluid, are futile in the greatest degree. Impulsion, by absolute contact, is so far from being a familiar phenomenon, that it may justly be questioned whether we have ever observed a single instance of it. The supposition of an invisible impelling fluid is not more gratuitous than it is useless; because we have no proof that a particle of this fluid does or can come into contact with the body which we suppose impelled by it, and therefore it can give no explanation of an action that is apparently e distanti.

The general inference seems to be, that instead of explaining pressure by impulse we must not only derive all impulse from pressure, but must also ascribe all pressure to action from a distance; that is, to properties of matter by which its particles are moved without geometrical contact.

From all that has been said, we learn that physical or sensible contact differs from geometrical contact, in the same manner as physical solidity differs from that of the mathematician. Euclid speaks of cones and cylinders standing on the same base, and between the same parallels. These are not material solids, one of which would press the other out of its place. Physical contact is indicated, immediately and directly, by our sense of touch; that is, by exciting a pressure on our organ of touch when it is brought sufficiently near. It is also indicated by impulsion; which is the immediate effect of the pressure occasioned by a sufficient approximation of the body impelling to the body impelled. The impulsion is the completion of the same process that we observe in the example of magnets; but the extent of space and of time in which it is completed is so small that it escapes our observation, and we imagine it to be by contact and in an instant. We now see that it is similar to all other operations of accelerating or retarding forces, and that no change of velocity is instantaneous; but, as a body, in passing from one point of space to another, passes through the intermediate space, so, in changing from one velocity to another, it passes through all the intermediate degrees without the smallest saltus.

And, in this way, is the whole doctrine of impulsion brought within the pale of dynamics, without the admission of any new principle of motion. It is merely the application of the general doctrines of dynamics to cases where every accelerating or retarding force is opposed by another that is equal and contrary. We have found, that the opinion, that there is inherent in a moving body a peculiar force, by which it perseveres in motion, and puts another in motion by shifting into it, is as useless as it is inconsistent with our notions of motion and of moving forces. The impelled body is moved by the insuperable repulsion exerted by all atoms of matter when brought sufficiently near.

The retardation of the impelling body does not arise from an inertia, or resisting sluggishness of the body impelled, but because this body also repels any thing that is brought sufficiently near to it. We can have no doubt of the existence of such causes of motion. Springs, expansive fluids, cohering fibres, exhibit such active powers, without our being able to give them any other origin than the fiat of the Almighty, or to comprehend, in any manner whatever, how they reside in the material atom. But if once we admit their existence and agency, every thing else is deduced in the most simple manner imaginable, without involving us in any thing incomprehensible, or having any consequence that is inconsistent with the appearances. Whereas both of these obstructions to knowledge come in our way, when we suppose any thing analogous to force inherent in a moving body solely because it is in motion. It compels us to use the unmeaning language of force and motion passing out of one body into another; and to speak of force and velocity as things capable of division and actual separation into parts.

As no part of mechanical philosophy has been so much debated about as impulsion, it will surely be agreeable to our readers to have a notice of the different treatises which have been published on the subject:

Galilei Opera, T. I. 957. II. 479, &c.

Jo. Wallisii Tractatus de Percussione. Oxon. 1669.

Chr. Hugenius de Motu Corporum ex Percussione. Op. II. 73.

Traité de la Percussion des Corps, par Mariotte, Op. I. 1.

Hypothesis Physica Nova, qua phenominorum causæ ab unico quodam universali motu in nostro globo supposito repetuntur. Auct. G. G. Leibnitzio. Moguntiæ 1671.—Leibn. Op. T. II. p. II. 3.

Ejusdem Theoria Motus Abstracti. Ibid. 35.

Hermanni Phoronomia. Amst. 1716.

Discours sur les Loix de la Communication de Mouvement, par Jean Bernoulli, Paris, 1727. Jo. Bern. Oper. III.

Dynamique de D'Alembert.

Euleri Theoria Corporum solidorum seu rigidorum, 1765.

Borelli (Alphons) de Percussione.

See also M'Laurin's Fluxions, and his account of Newton's Philosophy, for his Dissertation crowned by the Acad. des Sciences at Paris.—Dr. Jurin's elaborate dissertations in the Phil. Trans. No. 479.—Gravesande's Nat. Philosophy, where there is a most laborious collection of experiments and reasonings; all of which receive a complete explanation by the 39th Prop. Princip. Neutoni I. There are likewise many very acute philosophical observations in Lambert's Gedanken über die Grundlehren des Gleichgewichts, und der Bewegung, in the second part of his Gebrauch der Mathematik.—Also, in the works of Kaestner, Hamberger, and Busch. Musehenbroeck also treats the subject at great length, but not very judiciously. The article "impulsion" in the supplement to the last edition of the Encyclopædia Britannica, is likewise well worth consulting by all who wish to comprehend thoroughly this interresting subject.

IMPU'LSIVE. *a.* (*impulsif*, French.) Having the power of impulse; moving; impellent (*South*).

IMPU'NITY. *s.* (*impunité*, French, *impunitas*, Latin.) Freedom from punishment; exemption from punishment (*Davies*).

IMPU'RE. *a.* (*impurus*, Latin.) 1. Defiled with guilt; unholy (*Donne*). 2. Contrary to sanctity; unhallowed (*Milton*). 3. Unchaste (*Addison*). 4. Feculent; foul with extraneous mixtures; drossy.

IMPU'RELY. *ad.* With impurity.

IMPU'RENESS. } IMPU'RITY. } *s.* (*impuritas*, Latin, from *impure.*) 1. Want of sanctity; want of holiness. 2. Act of unchastity (*Atterbury*). 3. Feculent admixture (*Arbuthnot*).

To IMPU'RPLE. *v. a.* (*empourprer*, Fr. from *purple.*) To make red; to colour as with purple (*Milton*).

IMPU'TABLE. *a.* (from *impute.*) 1. Chargeable upon any one; that of which one may be accused (*South*). 2. Accusable; chargeable with a fault (*Ayliffe*).

IMPU'TABLENESS. *s.* The quality of being imputable (*Norris*).

IMPUTA'TION. *s.* (*imputation*, French, from *impute.*) 1. Attribution of any thing: generally of ill; sometimes of good (*Dryden. Shakspeare*). 2. Censure; reproach (*Addison*). 3. Hint; slight notice (*Shakspeare*).

IMPU'TATIVE. *a.* (from *impute.*) That may impute (*Ainsworth*).

To IMPU'TE. *v. a.* (*imputer*, French, *imputo*, Latin.) 1. To charge upon; to attribute: generally ill; sometimes good (*Romans. Temple*). 2. To reckon to one what does not properly belong to him (*Milton*).

IMPU'TER. *s.* (from *impute.*) He that imputes.

IN. *prep.* (*in*, Latin.) 1. Noting the place where any thing is present: in *the house* (*Fairfax*). 2. Noting the state or thing present at any time; *he is in prosperity* (*Smalridge*). 3. Noting the time; *it happened* in *that year* (*Locke*). 4. Noting power: in *his choice* (*Spenser*). 5. Noting proportion: *nine* in *ten* (*Swift*). 6. According to (*Collier*). 7. Concerning (*Locke.*) 8. A solemn phrase: used thus, in *the king's name* (*Dryden*). 9. Noting cause: in *my behalf* (*Shakspeare*). 10. In *that*. Because (*Shakspeare*). 11. In *as much*. Since; seeing that (*Hooker*).

IN. *ad.* 1. Within some place; not out (*South*). 2. Engaged to any affair (*Daniel*). 3. Placed in some state (*Pope*). 4. Noting immediate entrance (*Shakspeare*). 5. Into any place (*Collier*). 6. Close; home (*Tatler*).

IN has commonly in composition a negative or privative sense, as in the Latin: so, *active* denotes that which *acts*, *inactive* that which does *not act*. *In* before *r* is changed into *r*; as *irregular*: before *l* into *l*; as *illative*: and into *m* before some other consonants; as *improbable*.

INABI'LITY. *s.* (*in* and *ability.*) Impuissance; impotence; want of power (*Hooker*).

INA'BSTINENCE. *s.* (*in* and *abstinence.*) Intemperance; want of power to abstain; prevalence of appetite (*Milton*).

INACCE'SSIBLE. *a.* (*innaccessible.* Fr.)

Not to be reached; not to be approached (*Ray*).

INA'CCURACY. *s.* (from *inaccurate.*) Want of exactness.

INA'CCURATE. *a.* (*in* and *accurate.*) Not exact; not accurate.

INA'CTION. *s.* (*inaction*, French.) Cessation from labour; forbearance of labour (*Pope*).

INA'CTIVE. *a.* (*in* and *active.*) Not busy; not diligent; idle; indolent; sluggish.

INA'CTIVELY. *ad.* Idly; without labour; without motion; sluggishly (*Locke*).

INACTI'VITY. *s.* (*in* and *activity.*) Idleness; rest; sluggishness (*Rogers*).

INA'DEQUATE. *a.* (*in* and *adæquatus*, Latin,) Not equal to the purpose; defective (*Locke*).

INA'DEQUATELY. *ad.* Defectively; not completely (*Boyle*).

INADVE'RTENCE. } *s.* (*inadvertance*,
INADVE'RTENCY. } French.)
1. Carelessness; negligence; inattention (*South*). 2. Act or effect of negligence (*Ad.*)

INADVE'RTENT. *a.* (*in* and *advertens*, Latin.) Negligent; careless.

INADVE'RTENTLY. *ad.* Carelessly; negligently (*Clarissa*).

INA'LIENABLE. *a.* (in and *alienable.*) That cannot be alienated, or granted to another.

INALIME'NTAL. *a.* (*in* and *alimental.*) Affording no nourishment (*Bacon*).

INAMI'SSIBLE. *a.* (*inamissible*, French.) Not to be lost (*Hammond*).

INA'NE. *a.* (*inanis*, Latin.) Empty; void (*Locke*).

To INA'NIMATE. *v. a.* (*in* and *animo*, Latin.) To animate; to quicken: not in use (*Donne*).

INA'NIMATE. } *a.* (*inanimatus*, Latin.)
INA'NIMATED. }
Void of life; without animation (*Bacon. Cheyne*).

INANI'TION. *s.* (*ination*, French) Emptiness of body; want of fulness in the vessels of the animal (*Arbuthnot*).

INA'NITY. *s.* (from *inanis*, Latin.) Emptiness; void space (*Digby*).

INA'PPETENCY. *s.* (*in* and *appententia*,) Latin.) Want of stomach or appetite.

INA'PPLICABLE. *a.* (*in* and *applicable.*) Not to be put to a particular use.

INAPPLICABI'LITY. *s.* (from *inapplicable.*) Unfitness for the particular purpose.

INAPPLICA'TION. *s.* (*inapplication*, Fr.) Indolence; negligence.

INA'RABLE. *a.* (*in* and *aro*, Latin.) Not capable of tillage.

To INA'RCH. *v. a.* (*in* and *arch.*) Inarching is called grafting by approach; and is used when the stock and the tree may be joined (*Miller*).

INA'RCHING, or INARCH-GRAFTING, in gardening, a mode of grafting by which the parts of different trees, intended to be united, are bent down and placed in contact while the trees remain growing. This process, which is sometimes called, also, ABLACTATION, can only be performed when the stocks that are designed to be grafted, and the tree from which the graft is to be taken, stand so near as that they may be easily made to meet. It is commonly practised on tender exotic plants, and some other sorts which do not succeed by any of the other methods. In performing the process, a part of the stock or branch is slit off, about two inches in length, a smooth part of the stork being always chosen for the purpose: then a small notch made in this slit of the stock downward, in the same manner as is used for whip-grafting: the branch of the tree designed to be inarched having a part slit off in the same manner as the stock, and a slit made upward in it, so as to leave a tongue; which tongue should be inserted into the slit of the stock, joining their rinds equally, that they may unite well together: after which a ligature of bass should be made, so as to keep them exactly in their situation, and afterwards this part of the stock clayed over well to keep out the air. In this method of grafting, the scion is not separated from the tree until it is firmly united with the stock; nor is the head of the stock or branch, which is grafted, cut off till the same time, and only half the wood pared off with a slope, about three inches in length, and the same of the scion or graft. In this method of grafting, the operation is not performed so early in the season as in the others, never being done till the month of April, when the sap is flowing; at which time the scion and stork will join together, and unite much sooner than at any other season or period of the year. It is principally employed in raising jasmines, oranges, and other exotic trees of the harder kinds.

It has been found that the walnut, fig, and mulberry will take by this method of grafting, while neither of them succeed in any of the other modes. Several sorts of evergreens may likewise be propagated by this method of grafting: but all the trees that are grafted in this way are weak, and never grow to the size of those which are grafted by the other methods. It is hence rarely practised, except on such sorts of trees as will not succeed otherwise.

The Chinese procees of inarching is of a very different character from the above, and on many accounts is worthy of notice. This is called by Dr. Hewitson the process of ABSCISSION, and affords a promise of the production of fruit much earlier than from seeds, or than from any other mode of grafting, though it is probable a larger period would be necessary for the process in England than in India. We shall take our account from Dr. Hewitson's description in vol. XXV. of the Transactions of the Society for the Encouragement of Arts, Manufactures and Commerce." "They select," says he, "a tree of that species which they wish to propagate, and fix upon such a branch as

will least hurt or disfigure the tree by its removal. Round this branch, and as near as they can conveniently to its junction with the trunk, they wind a rope made of straw, besmeared with cow-dung, until a ball is formed five or six times the diameter of the branch. This is intended as a bed into which the young roots may shoot. Having performed this part of the operation, they immediately under the tree divide the bark down to the wood, for nearly two-thirds of the circumference of the branch. A cocoa-nut-shell, or small pot, is then hung over the ball with a hole in its bottom, so small, that water put therein will only fall in drops. By this the rope is constantly kept moist; a circumstance necessary to the easy formation of the young roots, and to the supply of nourishment to the branch from this new new channel. During three succeeding weeks nothing farther is required except supplying the vessels with water. At the expiration of that period, one-third of the remaining bark is cut, and the former incision is carried considerably deeper into the wood, as by this time it is expected that some roots have struck into the rope, and are giving their assistance in support of the branch. After a similar period the same operation is repeated; and in about two months from the commencement of the process, the roots may generally be seen intersecting each other on the surface of the ball, which is a sign that they are sufficiently advanced to admit of the separation of the branch from the tree. This is best done by sawing it off at the incision, care being taken that the rope, which by this time is nearly rotten, is not shaken off by the motion. The branch is then planted as a young tree."

INARTI'CULATE. *a.* (*inarticulé*, French, *in* and *articulate.*) Not uttered with distinctness, like that of the syllables of human speech (*Dryden*).

INARTI'CULATELY. *ad.* Not distinctly.

INARTI'CULATENESS. *s.* (from *inarticulate.*) Confusion of sounds; want of distinctness in pronouncing.

INARTIFI'CIAL. *a.* (*in* and *artificial.*) Contrary to art (*Decay of Piety*).

INARTIFI'CIALLY. *ad.* Without art; in a manner contrary to the rules of art (*Collier*).

INATTE'NTION. *s.* (*inattention*, French.) Disregard; negligence; neglect (*Rogers*).

INATTE'NTIVE. *a.* (*in* and *attentive.*) Careless; negligent; regardless (*Watts*).

INAU'DIBLE. *a.* (*in* and *audible.*) Not to be heard; void of sound (*Shakspeare*).

To INAU'GURATE. *v. a.* (*inauguro*, Lat.) To consecrate; to invest with a new office by solemn rites (*Watton*).

INAUGURA'TION. *s.* (*inauguration*, Fr.) Investiture by solemn rites (*Howel*).

INAURA'TION. *s.* (*inauro*, Latin.) The act of gilding or covering with gold (*Arbuthnot*).

INAUSPI'CIOUS. *a.* (*in* and *auspicious.*) Ill-omened; unlucky; unfortunate (*Crashaw*).

INBE'ING. *s.* (*in* and *being.*) Inherence; inseparableness (*Watts*).

I'NBORN. *a.* (*in* and *born.*) Innate; implanted by nature (*Dryden*).

INBRE'ATHED. *a.* (*in* and *breath.*) Inspired; infused by inspiration (*Milton*).

I'NBRED. *a.* (*in* and *bred.*) Produced within; hatched or generated within (*Milton*).

INCA, or YNCA, a name given by the natives of Peru to their kings, and the princes of the blood.

I'NCAGE *v. a.* (*in* and *cage.*) To coop up; to shut up; to confine in a cage, or any narrow space (*Shakspeare*).

INCALE'SCENCE. } INCALE'SCENCY. } *s.* (*incalesco*, Latin.) The state of growing warm; warmth; incipient heat (*Ray*).

INCALESCENT MERCURY, a substance prepared from mercury by Mr. Boyle, which on being mingled with gold leaf or small filings of that metal, would become hot and amalgamate with the gold.

INCA'MERATION, a term used in the chancery of Rome, for the uniting of lands, revenues, or other rights, to the pope's domain.

INCANTA'TION. *s.* (*incantation*, French.) Charms uttered by singing; enchantment (*Raleigh*).

INCA'NTATORY. *a.* (from *incanto*, Lat.) Dealing by enchantment; magical (*Brown*).

To INCA'NTON. *v. a.* (*in* and *canton.*) To unite to a canton or separate community (*Addison*).

INCAPABI'LITY. } INCA'PABLENESS. } *s.* (from *incapable.*) Inability natural; disqualification legal (*Suckling*).

INCA'PABLE. *a.* (*incapable*, French.) 1. Wanting power; wanting understanding; unable to comprehend, learn, or understand (*Shakspeare*). 2. Not able to admit or have any thing (*Clarendon*). 3. Unable; not equal to any thing (*Shakspeare*). 4. Disqualified by law (*Swift*).

INCAPA'CIOUS. *a.* (*in* and *capacious.*) Narrow; of small content (*Burnet*).

INCAPA'CIOUSNESS. *s.* (from *incapacious.*) Narrowness; want of containing space.

To INCAPA'CITATE. *v. a.* (*in* and *capacitate.*) 1. To disable; to weaken (*Clarissa*). 2. To disqualify (*Arbuthnot*).

INCAPA'CITY. *s.* (*incapacité*, French.) Inability; want of natural power; want of power of body; want of comprehensiveness of mind (*Arbuthnot*).

To INCA'RCERATE. *v. a.* (*incarcero*, Latin.) To imprison; to confine (*Harvey*).

INCARCERA'TION. *s.* (from *incarcerate.*) Imprisonment; confinement.

To INCA'RN *v. a.* (*incarno*, Latin.) To cover with flesh (*Wiseman*).

To INCA'RN. *v. n.* To breed flesh (*Wiseman*).

To INCA'RNADINE *v. a.* (*incarnadino*, pale red, Italian.) To die red (*Shakspeare*).

To INCA'RNATE. *v. a.* (*incarner*, Fr.

incarno, Latin.) To clothe with flesh; to embody with flesh (*Milton*).

INCA'RNATE. *partic. a.* (*incarnat*, Fr.) Clothed with flesh; embodied in flesh (*Sand.*)

INCARNA'TION. *s.* (*incarnation*, French.) 1. The act of assuming body (*Taylor*). 2. The state of breeding flesh (*Wiseman*).

INCARNA'TION, in theology, signifies the act whereby the Son of God assumed the human nature; or the mystery by which Jesus Christ, the eternal word, was made man, in order to accomplish the work of our salvation. The era long used among Christians, whence they number their years, was the time of the incarnation, that is, of Christ's conception in the virgin's womb (See EPOCH.)

INCA'RNATIVE. *s.* (*incarnatif*, French.) A medicine that generates flesh (*Wiseman*).

INCARTATION, in chymistry, the refining of gold by means of silver and aquafortis; otherwise called departing.

INCARVI'LLEA. In botany, a genus of the class didynamia, order angiospermia. Calyx five-cleft; corol tubular, five-cleft, unequal, with the orifice swelling: anthers, two of them with two awns, two of them awnless; silique two-celled; seeds; seeds with membranaceous wings. One species; a native of China with herbaceous stem, and purple, terminal flowers in loose spikes.

To INCA'SE. *v. a.* (*in* and *case.*) To cover; to enclose; to inwrap (*Pope*).

INCAU'TIOUS. *a.* (*in* and *cautious.*) Unwary; negligent; heedless (*Keil*).

INCAU'TIOUSLY. *ad.* Unwarily; heedlessly; negligently (*Arbuthnot*).

INCE'NDIARY. *s.* (*incendiarius*, from *incendo*, Latin.) 1. One who sets houses or towns on fire in malice or for robbery. 2. One who inflames factions, or promotes quarrels (*King Charles. Bentley*).

Among the ancients, criminals of this kind were to be burnt. Qui ædes, acervumque frumenti juxta domum positum, sciens, prudensque dolo malo combusserit, vinctus igni necatur. The punishment of arson was death by our ancient Saxon laws, and by the Gothic constitutions: and in the reign of Edward I. incendiaries were burnt to death. The stat. 8 Hen. VI. c. 6. made the wilful burning of houses, under special circumstances, high treason; but it was reduced to felony by the general acts of Edward VI. and Queen Mary. This offence was denied the benefit of clergy by 21 Hen. VIII. c. 1. which statute was repealed by 1 Edw. VI. c. 12; and arson was held to be ousted of clergy, with respect to the principal, by inference from the stat. 4 and 5 P. and M. c. 4. which expressly denied it to the accessory; though now it is expressly denied to the principal also, by 9 Geo. I. c. 22.

INCE'NSE, or FRANKINCENSE, in the materia medica, &c. a dry resinous substance, known among authors by the names Thus and Olibanum. Incense is a rich perfume, with which the Pagans, and the Roman Catholics still, perfume their temples, altars, &c. The word comes from the Latin incensum, q. d. burnt; as taking the effect for the thing itself.

The burning of incense made part of the daily service of the ancient Jewish church. The priests drew lots to know who should offer it: the destined person took a large silver dish, in which was a censer full of incense, and, being accompanied by another priest carrying some live coals from the altar, went into the temple. There, in order to give notice to the people, they struck upon an instrument of brass placed between the temple and the altar; and being returned to the altar, he who brought the fire left it there, and went away. Then the offerer of incense, having said a prayer or two, waited the signal, which was the burning of the holocaust; immediately upon which, he set fire to the incense, the whole multitude continuing all the time in prayer. The quantity of incense offered each day was half a pound in the morning, and as much at night.

To I'NCENSE. *v. a.* (from the noun.) To perfume with incense.

To INCE'NSE, *v. a.* (*incensus*, Latin.) To enkindle to rage; to inflame with anger; to enrage; to provoke; to exasperate. (*Dryd.*)

INCE'NSEMENT. *s.* (from *incense.*) Rage; heat; fury (*Shakspeare*).

INCE'NSION. *s.* (*incensio*, Latin.) The act of kindling; the state of being on fire (*Bacon*).

INCE'NSOR. *s.* (Lat.) A kindler of anger; an inflamer of passions (*Hayward*).

INCE'NSORY. *s.* (from *incense.*) The vessel in which incense is burnt and offered (*Ainsworth*).

INCE'NTIVE. *s.* (*incentivum*, Latin.) 1. That which kindles (*King Charles*). 2. That which provokes; that which encourages; incitement; motive; encouragement; spur (*Addison*).

INCE'NTIVE. *a.* Inciting; encouraging.

INCE'PTION. *s.* (*inceptio*, Latin.) Beginning (*Bacon*).

INCE'PTIVE. *a.* (*inceptivus*, Latin.) Noting beginning (*Locke*).

INCE'PTOR. *s.* (Latin.) A beginner; one who is in his rudiments.

INCERA'TION. *s.* (*incero*, Latin.) The act of covering with wax.

INCE'RTITUDE. *s.* (*incertitude*, Fr. *incertitudo*, Latin.) Uncertainty; doubtfulness.

INCE'SSANT. *a.* (*in* and *cessans*, Latin.) Unceasing; unintermitted; continual; uninterrupted (*Pope*).

INCE'SSANTLY. *ad.* (from *incessant.*) Without intermission; continually. (*Addis.*)

INCE'ST, the crime of venereal commerce between persons who are related in a degree prohibited marriage by the laws of the country. See CESTUS.

Some are of opinion, that marriage ought to be permitted between kinsfolks, to the

end that the affection, so necessary in marriage, might be heightened by this double tie; and yet the rules of the church have formerly extended this prohibition even to the seventh degree, but time has now brought it down to the third or fourth degree. See MARRIAGE.

Most nations look on incest with horror, Persia and Egypt alone excepted. In the history of the ancient kings of those countries, we meet with instances of the brother's marrying the sister: the reason was, because they thought it too mean to join in alliance with their own subjects; and still more so, to have married into the families of any foreign princes.

As to the Persians, there was a still more abominable sort of incest practised by their magi, if we may trust Catullus, *carm.* 91.

Nam magus ex matre & gnato gignatur oportet,
Si vera est Persarum impia religio,

INCE'STUOUS. *a.* (*incestueux*, French.) Guilty of incest; guilty of unnatural cohabitation (*South*).

INCE'STUOUSLY. *ad.* (from *incestuous.*) With unnatural love (*Dryden*).

INCH. *s.* (ince, Saxon; *uncia*, Latin.) 1. A measure of length supposed equal to three grains of barley laid end to end; the twelfth part of a foot (*Holder*). 2. A proverbial name for a small quantity. 3. A nice point of time (*Shakspeare*).

To INCH. *v. a.* (from the noun.) 1. To drive by inches (*Dryden*). 2. To deal out by inches; to give sparingly.

To INCH. *v. n.* To advance or retire a little at a time.

INCH OF CANDLE. See CANDLE.

INCHCOLM, a small island of Scotland, in the Frith of Forth, near the coast of Fife; whither Alexander I. king of Scotland, is said to have been driven in a tempest, in the beginning of the twelfth century, and to have founded a monastery, in gratitude for his escape.

INCHKENNETH, a small island near the west coast of Scotland: one mile and a half W. Mull.

INCHMARNOCH, a small island near the west coast of the Isle of Bute, where are the ruins of a chapel. The extent of this little isle is about a mile, has a hundred and twenty acres of arable land, forty of brush wood, near three hundred of moor, with strata of coral and shells on the west side.

INCHA'NTMENT. See ENCHANTMENT and WITCHCRAFT.

I'NCHED. *a.* (with a word of number before it.) Containing inches in length or breadth.

I'NCHIPIN. *s.* Some of the inside of a deer (*Ainsworth*).

I'NCHMEAL. *s.* (*inch* and *meal.*) A piece an inch long (*Shakspeare*).

To I'NCHOATE. *v. a.* (*inchoo*, Latin.) To begin; to commence (*Raleigh*).

INCHOA'TION. *s.* (*inchoatus*, Latin.) Inception; beginning (*Hale*).

I'NCHOATIVE. *a.* (*inchoativus*, Latin.) Inceptive; noting inchoation or beginning.

To INCI'DE. *v. a.* (from *incido*, Latin.) To cut. Medicines are said to *incide* which consist of pointed or sharp particles, by which the particles of other bodies are divided (*Quincy*).

I'NCIDENCE. } I'NCIDENCY. } *s.* (*incido*, to fall, Latin; *incidence*, French.) 1. The direction with which one body strikes upon another; and the angle made by that line, and the plane struck upon, is called the angle of *incidence* (*Quincy*). 2. (*Incidens*, Latin.) Accident; hap; casualty. (*Shak.*)

I'NCIDENT. *a.* (*incident*, Fr. *incidens*, Latin.) 1. Casual; fortuitous; occasional; happening accidentally; falling in beside the main design; happening beside expectation (*Watts*). 2. Happening; apt to happen (*South*).

I'NCIDENT. *s.* (from the adjective.) Something happening beside the main design; casualty (*Dryden*).

INCIDE'NTAL. *a.* Incident; casual; happening by chance (*Milton*).

INCIDE'NTALLY. *ad.* Beside the main design; occasionally (*Sanderson*).

I'NCIDENTLY. *ad.* (from *incident.*) Occasionally; by the by; by the way (*Bacon*).

To INCI'NERATE. *v. a.* (*in* and *cineres*, Latin.) To burn to ashes (*Harvey*).

INCIRCUMSPE'CTION. *s.* (*in* and *circumspection.*) Want of caution; want of heed (*Brown*).

INCI'SED. *a.* (*incisus*, Lat.) Cut; made by cutting (*Wiseman*).

INCI'SION. *s.* (*incision*, French.) 1. A cut; a wound made with a sharp instrument (*South*). 2. Division of viscosities by medicines (*Bacon*).

INCI'SIVE. *a.* (*incisif*, Fr. from *incisus*, Lat.) Having the quality of cutting or dividing (*Boyle*).

INCISIVUS INFERIOR. See LEVATOR *labii inferioris*.

INCISIVUS LATERALIS. See LEVATOR *labii superioris alæque nasi*.

INCISIVUS MEDIUS. See DEPRESSOR *labii superioris alæque nasi*.

INCISORS, *Dentes incisores*, from *incido*, to cut, from their use in cutting the food). The four front teeth of both jaws. See TEETH.

INCI'SORY. *a.* (*incisoire*, Fr.) Having the quality of cutting.

INCI'SURE. *s.* (*incisura*, Latin.) A cut; an aperture (*Derham*).

INCITA'TION. *s.* (*incitatio*, Lat.) Incitement; incentive; motive; impulse (*Brown*).

To INCI'TE. *v. a.* (*incito*, Lat.) To stir up; to push forward in a purpose; to animate; to spur; to urge on (*Swift*).

INCI'TEMENT. *s.* (from *incite.*) Motive; incentive; impulse; inciting power (*Milton*).

INCI'VIL. *a.* (*incivil*, Fr.) Unpolished.

INCIVI'LITY. *s.* (*incivilité*, French.) 1.

Want of courtesy; rudeness (*Tillotson*). 2. Act of rudeness (*Taylor*).

INCLE, a kind of tape made of linen yarn.

INCLE'MENCY. *s.* (*inclementia*, Latin.) Unmercifulness; cruelty; severity; harshness; roughness (*Dryden*).

INCLE'MENT. *a.* (*in* and *clemens*, Lat.) Unmerciful; unpitying; void of tenderness; harsh (*Milton*).

INCLI'NABLE. *a.* (*inclinabilis*, Lat.) 1. Having a propension of will; favourably disposed; willing (*Hooker*). 2. Having a tendency (*Bentley*).

INCLINA'TION, is a word frequently used by mathematicians, and signifies the mutual approach, tendency, or leaning of two lines or two planes towards each other, so as to make an angle. In this sense we speak of the inclination of meridians, inclination of rays, &c.

INCLINATION, also tendency or appetence, as, 1. Tendency toward any point (*Newton*). 2. Natural aptness (*Addison*). 3. Propension of mind; favourable disposition; incipient desire (*Clarendon*). 4. Love; affection; regard (*Dryden*). 5. Disposition of mind (*Shakspeare*). 6. The tendency of the magnetical needle to the east or west. 7. (In pharmacy.) The act by which a clear liquor is poured off from some feces or sediment by only stooping the vessel (*Quincy*).

INCLINATION *of the Earth's Axis*, is the angle it makes with the plane of the ecliptic. See AXIS.

INCLINATION *of the Orbit of a Planet*, is the angle formed by the planes of the ecliptic and of the orbit of the planet. The quantity of this inclination for the several planets, is as follows, viz. Mercury, 7°; Venus, 3° 23′ 35″; Mars, 1° 51′; Jupiter, 1° 18′ 56″; Saturn, 2° 29′ 50″; Herschel, 46′ 20″. These inclinations are subject to variations arising from the mutual attractions of the planets. See ASTRONOMY.

INCLI'NATORY. *a.* (from *incline*.) Having a quality of inclining to one or other (*Brown*).

INCLI'NATORILY. *ad.* (from *inclinatory*.) Obliquely; with inclination to one side or the other (*Brown*).

To INCLI'NE. *v. n.* (*inclino*, Lat.) 1. To bend; to lean; to tend toward any part (*Brown*). 2. To be favourably disposed to; to feel desire beginning (*Shakspeare*).

To INCLI'NE. *v. a.* 1. To give a tendency or direction to any place or state (*Pope*). 2. To turn toward any thing, as desirous or attentive (*Milton*). 3. To bend; to incurvate (*Dryden*).

INCLI'NED PLANE, in mechanics, one that makes an oblique angle with the horizon. If a force, with a given direction, supports a weight upon an inclined plane, that force is to the weight, as the sine of the inclination of the plane to the sine of the angle which is made by the line in which the force acts, and the line perpendicular to the plane. See DYNAMICS, STATICS, &c.

INCLINED PLANES (Under-ground), have been sometimes constructed to communicate from the higher to the lower branches of a canal. The following account of a contrivance of this kind, executed at Walkden Moor, in Lancashire, by the duke of Bridgewater's directions, was presented by the Rev. Mr. Egerton, to the Society for the Encouragement of Arts, &c. who voted his Grace their gold medal:

At Worsley, the duke of Bridgewater's navigation begins; it goes west to Leigh, and east to Manchester, where it locks up into the Rochdale canal. In its way to Manchester, it turns out, in a western direction, near Longford Bridge, to meet the Grand Trunk Canal, above Preston Brook; and from thence it goes north-west to Runcorn, where it locks down into the Mersey, in the tide-way to Liverpool.

To this navigation above ground, which, in all its directions, is extended through a length of forty miles, upon one level, without tunnel or lock, except the locks at the extremities, at Worsley an under-ground navigation is joined, which goes to the different mines of coal under Walkden Moor; from which mines, by these navigations above ground and under ground, Manchester and various other places are supplied with that valuable article. The canals of this under-ground navigation lie upon two levels, or stories. The lower is upon the same level with the open navigation, which it joins at Worsley; and consists, in the different lines which it pursues to the different seams of coals, of near twelve miles of tunnelling.

The higher is thirty-five yards and a half perpendicular height above the level of the lower, and varies from thirty-eight to sixty-one perpendicular yards below the surface of the earth, and consists of near six miles of tunnelling.

The tunnelling of each level is ten feet four inches wide, and eight feet six inches deep; and the depth of water, three feet seven inches.

Before a communication was made by an inclined plane, the coals were discharged by hand from the boats on the higher level, and were let down the pits in tubs, by an engine and a break-wheel, into those upon the lower. To convey the boats themselves from the canals of the higher level into that of the lower, was the intent of making this under-ground inclined plane. By the help of this machinery, the whole business is now done at once, without discharging or damaging the coal, and at one-fourth of the expence: for the boats of the higher level, are bodily let down the inclined plane, and are floated from the foot of it through nearly three miles, in a straight line, of the lower level canal, into the open navigation at

Worsley: and whereas they were before obliged to be drawn up to the surface of the earth at great inconvenience and expence, to be repaired at a work-shop on Walkden Moor, they now come of themselves, in their course of business, to be repaired at the great dock-yard, at Worsley.

The place where the inclined plane is constructed, is adapted in a singular way for the purpose. There is a bed of white rock, or grit, eight yards twelve inches deep, which dips one in four, lying exactly in the direction most convenient for the communication between the two levels; which bed of rock is hollowed into a tunnel, driven upon the rise of the metals, by blasting with gunpowder, and working it down with wedges and hammers. In this tunnel, formed through a rock reaching from the lower to the higher level, the inclined plane is fixed; and, by its being in the heart of a rock, the whole workmanship can be pinned, secured, and compacted together at the top, bottom, and sides, most effectually: an advantage which no inclined plane above ground can have, and which renders this a singular production, no where perhaps to be imitated.

The run of the inclined plane is one hundred and fifty-one yards, besides eighteen yards, the length of the locks, at the north or upper end: and the fall is one in four, corresponding with the dip of the rock. Of these one hundred and fifty-one yards, about ninety-four yards are formed into a double waggon-way, in order to let two boats, namely, the empty and the loaded boats, pass up and down; and are divided by a brick wall, supporting the roof, in which are openings for a person to escape out of the way of the boats; which double waggon-way joins in one, about fifty-seven yards from the lower level. The whole width of the double waggon-way is nineteen feet, and of the single waggon-way, after the junction, ten feet. These waggon-ways are supplied with iron rails, or gullies, laid on sleepers, down the whole run; and the height of the roof, above the iron rails, is eight feet.

At the top of the inclined plane there is a double lock, or rather two locks, side by side, formed in the heart of the same rock, which deliver the loaded boats from the higher level down the inclined plane, and receive the empty boats from the lower. The length of that part of the tunnel in which these are formed, is eighteen yards; the width or diameter, twenty feet six inches; and the height of the roof, at the north end and above the locks, at *d d*, Pl. 88. fig. 10. twenty-one feet, to admit the break-wheel.

The bottom, or south end of the inclined plane, is six feet nine inches under the surface of the water, where the loaded boat floats off the carriage upon the canal of the lower level.

The depth of the locks, under water, at the north end, is four feet six inches; at the south end it is eight feet.

The wall between the locks is nine inches above the surface of the level water; its breadth is three feet.

The diameter of the horizontal main-shaft, upon which the rope works to let the loaded boats down, and to draw the empty boats up, is four feet eleven inches, and its circumference is fifteen feet five inches. The main rope is two inches and a half in diameter, and seven inches and a half in circumference. It is wrapped round with a small cord of about an inch in circumference, for the length of about one hundred and five yards, to prevent its wearing, which it does chiefly when it drags upon the bottom, when at work, at the place where the waggon-ways unite; and, for the same purpose, rollers of eight inches diameter are fixed at intervals down the run of the inclined plane. Moreover, a hollow cast-iron roller of eight inches and a half diameter is fixed across the west lock, parallel to the upper west lock-gate, and near the north end of the lock, but half a yard higher than the gate, in order to bear up the rope, and to prevent it from swagging.

A hold-fast rope is fastened to the main-rope, to stay each boat upon its waggon, as they go up or down. It is marked *k k*, in fig. 10. and its uses are more particularly detailed in the table of reference, at *k k*, to that plate.

Upon this horizontal main-shaft is a break-wheel above mentioned, which regulates the motion of the loaded boat going down the inclined plane.

The number of iron teeth, or cogs, in the spur-wheel, which is fastened to the side of the break-wheel, is three hundred and seventy-two: and the little nut-wheel, No. 3. fig. 2. which sets it in motion, contains eleven teeth, or cogs. The nut-wheel is supported by two uprights from the pillar to the roof, and works between them. Two winches or handles, No. 44. fig. 2. on its axis, put the main-shaft, *d d*, fig. 1. or No. 1. fig. 2. in motion. The power of both united, enables a man, who uses a force equal to forty pounds weight, to set forward two tons upon the waggon-road: and this force, multiplied at the winches or handles, may be used to set forward the loaded boat out of one lock, and to bring the empty boat into the other. The boats being thus put in motion, the little nut-wheel is disengaged from the main-shaft, by a slide drawing the little nut sideways, so as to disengage the teeth, or cogs, from the cogs of the spur-wheel. The weight of four tons going down, bring up about one.

The spur-wheel, however, which is fastened to the break-wheel, No. 2. fig. 11. is seldom used, as it is occasionally only put in motion to regulate the stretch of the ropes when new, and to draw the light boat into

the lock, when, at any time, it may happen to be over-weighted with materials, such as mortar, props, slabs, &c. for the use of the higher level collieries; and will not move of itself, upon a balance, out of the lower level.

The length of the carriage, or cradle, is thirty feet; its width is seven feet four inches. It moves upon four solid cast-iron rollers, which run upon cast-iron plates; on one side of each of which there are iron crests, which stand two inches higher than the plates, and prevent the carriage from running off the road.

The weight of neat coal, contained in the loaded boat, is about twelve tons: the boat weighs about four tons; and the carriage, or cradle, in which the boat is placed, when conveyed down the inclined plane, is about five tons: in all, about twenty-one tons.

At this inclined plane, thirty loaded boats are now let down with ease, in about eight hours; that is to say, four boats are let down in a little more than an hour. The boats used in these collieries are of different sizes and dimensions; some will carry seven, some eight and a half, some twelve tons.

The weight of neat coal, independently of the weight of the carriage and boats, which is let down the inclined plane, in twelve-ton boats, in eight hours, will consequently be three hundred and sixty tons. The weight of the carriage, suppose five tons, let down in the same time, will be one hundred and fifty tons; and the weight of the boat, suppose four tons, thirty times down, in eight hours, will be one hundred and twenty tons: in all six hundred and thirty tons down in eight hours.

The weight of the carriage thirty times up, and thirty boats up, in eight hours, will be

Carriage, at 5 tons, 30 times up = 150 tons
Boat, at 4 tons, 30 times up = 120 tons

In all 270 tons up in eight hours.

So that there will be 630 tons down
270 tons up.

In all 900 tons moved at the inclined plane, in eight hours, exclusive of an indeterminate quantity of materials occasionally brought up for the use of the higher level collieries.

The various feeders which are loosened by opening the coals in the higher level collieries, as well as three sufficient reservoirs, which may occasionally be resorted to, and used in a dry season, keep the higher level always to its height, and afford a constant supply of water to fill the locks, for the purpose of working the inclined plane.

This inclined plane was begun in September, 1795: it was finished, and in use, in October, 1797.

Of this, as of most of his other great works, the duke of Bridgewater was himself the planner and contriver: to project greatly, and to execute completely, are the perfection of genius.

The singularity of the place in which it is constructed; the original boldness of the design; the ingenuity and mechanism displayed in planning and executing it; the dispatch with which it has been finished; the simplicity, beauty, and harmony of its parts, tending to one united whole; and, above all, the perfection to which it is proved to have been brought, now that it is practically in use, render it equally astonishing with any other of the stupendous works which have been so ably planned, and so successfully executed, by the first projector and patriotic father of inland navigation.

References to Plate 88. fig. 10. *a* to *b*, dip of the metals and waggon-road on the under-ground inclined plane. From *b*, on the lower level, to the mouth of the tunnel, is three miles; A, the east lock; B, the west lock; C, represents a section of the lock: the dotted line shews the horizontal depth, and the black line under it, the slope upon which the waggon-wheels run to receive the loaded boat, or to bring the empty boat into the lock; *d*, *d*, the main-shaft, four feet eleven inches diameter, upon which the ropes work to wind the boats up and down; and here also the break-wheel is fastened on, together with a spur-wheel, and a nut-wheel. See fig. 11. No. 1: *e*, a passage between the higher level and the locks; *f*, *f*, a loaded boat going down, and an empty boat going up the under-ground inclined plane; G, a brick wall, from the sole to the top of the inclined plane, in order to give additional support to the roof; *h*, *h*, *h*, *h*, openings through the brick wall G, into which a person may step out of the way of the boats at the time they are passing up and down; *i*, a bell, which is rung by the rope dotted to *b*, upon the lower level, at the bottom of the under-ground inclined plane, to give notice when the empty boat is upon the waggon, or cradle, and when the men below are ready, that the loaded boat may be let down by the men above; *k*, *k*, hold-fast ropes fastened to the main-ropes, and hooked on to a ring at the south end of each boat, as it goes up or down, in order to stay the boats upon the waggon or cradle, that they may not swag, or slip off. These holdfast-ropes are spliced on to the end of the main-ropes, and run above and between the two bridle-ropes when they are fastened to the iron uprights, which are upon each side of the waggons, or cradles; and they run over the north end of the boat, to be hooked on to the south end; *l*, *l*, the bridle-ropes fastened to the main-ropes at O, and secured to

two iron uprights upon each side of the waggon, or cradle; O, O, the places where the main-ropes, the bridle-ropes, and the hold-fast-ropes, are fastened all together.

No. 1, an open space driven into the side of the lock A, to which a pit is sunk from the higher level, in order to convey the water out of the locks down to the lower level, and also to force a current of fresh air into the lower level collieries; No. 2, a paddle to let the water out of the lock A, into the pit No. 1; No. 3, a paddle to let the water out of the lock B, through a culvert, represented by dotted lines, under the lock A, into the pit No. 1; No. 7, 7, paddles in the lock-gates, to let the water out of the higher level into the locks; No. 8, 8, the two north lock-gates, one to each lock, which turn upon the heels of the gates, and swing round when they are opened or shut; No. 10, 10, two stops or cloughs, one to each lock, which serve as lock-gates to the south end, and are raised and let down by a windlass; S, a stop, which is used occasionally when the lock-gates want repairing; T, the place where the boats which are to pass to or from the lower single waggon-way are directed, at pleasure, into either part of the double waggon-way, by a moveable iron sleeper or plate at that point, upon which sleeper or plate the wheels of the boat-carriage or cradle run.

Fig. 11; 1, main-shaft, on which the rope laps; 2, break-wheel, on one side of which the spur-wheel is fastened; 3, nut-wheel, out of geer, but which slides into the spur-wheel, when used to draw the empty boat into the lock occasionally, and which is supported by two uprights from the pillar to the roof; 4, 4, winches or handles, to work the nut and spur-wheel; 5, 5, the main-ropes fastened to the boats, and which are lapped to prevent their wearing; 6, the spur-wheel, which is fastened on one side of the break-wheel; and on which break-wheel is a strong iron-jointed timber brace, which, according to the pressure given thereto by the man who attends it, will allow the loaded boat to descend quick or slow, or detain it in its passage; 7, 7, paddles in the lock-gates, to let the water out of the higher level into the lock; 8, a hollow cast-iron roller, to prevent the main-ropes from swagging; 9, shroud-wheel, to prevent the ropes going over the end of the main-shaft, slipping off, jerking, or breaking. This stands three inches above the main-shaft.

To INCLI'P. *v. a.* (*in* and *clip.*) To grasp; to enclose; to surround. (*Shak.*)

To INCLO'ISTER. *v. a.* (*in* and *cloister.*) To shut up in a cloister.

To INCLO'UD. *v. a.* (*in* and *cloud.*) To darken; to obscure. (*Shak.*)

To INCLU'DE. *v. a.* (*includo*, Latin.) 1. To enclose; to shut in. 2 To comprise; to comprehend (*Bacon*).

INCLUDING, in botany, a term applied to the calyx. An inclosing calyx. Shutting up and concealing the corell. As in Phalaris. Including sleep. *Includens somnus*. When alternate leaves approximate to the stalk during the night, so that the flower or tender twig is protected between them.

INCLU'SIVE. *a.* (*inclusif*, French.) 1. Enclosing; encircling. (*Shak.*) 2. Comprehended in the sum or number.

INCLU'SIVELY. *ad.* (from *inclusive.*) The thing mentioned reckoned into the account. From Sunday to Sunday *inclusively*; that is, taking both Sundays into the reckoning.

INCOA'GULABLE. *a.* (*in* and *coagulable.*) Incapable of concretion.

INCOEXI'STENCE. *s.* (*in* and *coexistence.*) The quality of not existing together (*Locke*).

INCO'G. *ad.* (corrupted by mutilation from *incognito*, Latin.) Unknown; in private (*Addison*).

INCO'GITANCY. *s.* (*incogitantia*, Latin.) Want of thought (*Boyle*).

INCO'GITATIVE. *a.* (*in* and *cogitative.*) Wanting the power of thought (*Locke*).

INCO'GNITO. *ad.* (*incognitus*, Latin.) In a state of concealment (*Prior*).

INCOHE'RENCE. } *s.* (*in* and *coherence.*)
INCOHE'RENCY. } 1. Want of cohesion; looseness of material parts (*Boyle*). 2. Want of connexion; incongruity; inconsequence of argument; want of dependance of one part upon another (*Locke*).

INCOHE'RENT. *a.* (*in* and *coherent.*) 1. Without cohesion; loose (*Woodward*). 2. Inconsequential; inconsistent; having no dependance of one part on another (*Locke*).

INCOHE'RENTLY. *ad.* Inconsistently; inconsequentially (*Broome*).

INCOLU'MITY. *s.* (*incolumitas*, Latin.) Safety; security (*Howel*).

INCOMBUSTIBI'LITY. *s.* (from *incombustible*). The quality of resisting fire (*Ray*).

INCOMBU'STIBLE. *a.* (*incombustible*, Fr.) Not to be consumed by fire (*Wilkins*).

INCOMBU'STIBLE CLOTH. See ASBESTUS.

INCOMBU'STIBLES, in chemistry, those substances which are incapable of burning, or which do not emit light and heat on their union with oxygen.

INCOMBU'STIBLENESS. *s.* (from *incombustible.*) The quality of not being wasted by fire.

I'NCOME. *s.* (*in* and *come.*) Revenue; produce of any thing (*South*).

INCOMMENSURABI'LITY. *s.* (from *incommensurable.*) The state of one thing with respect to another, when they cannot be compared by any common measure.

INCOMME'NSURABLE. *a.* (*in*, *con*, and *mensurabilis*, Latin.) Not to be reduced to any measure common to both (*Watts*).

INCOMME'NSURABLE, lines, or numbers, or quantities in general, are such as have no common measure, or no line, number, or quantity of the same kind, that will measure or divide them both without a remainder. Thus, the numbers 15 and 16 are incommensurable, because, though 15 can be measur-

ed by 3 and 5, and 16 by 2, 4, and 8, there is yet no single number that will divide or measure them both.

INCOMME'NSURABLE IN POWER, is said of quantities whose 2d powers, or squares, are incommensurable. As $\sqrt{2}$ and $\sqrt{3}$, whose squares are 2 and 3, which are incommensurable.

INCOMME'NSURATE. *a.* (*in*, *con*, and *mensura*, Latin.) Not admitting one common measure (*Holder*).

To INCO'MMODATE. } *v. a.* (*incommodo*, *To* INCOMMO'DE. } Latin.) To be inconvenient to; to hinder or embarrass without very great injury (*Woodward*).

INCOMMO'DIOUS. *a.* (*incommodus*, Lat.) Inconvenient to; vexatious without great mischief (*Hooker*).

INCOMMO'DIOUSLY. *ad.* Inconveniently; not at ease.

INCOMMO'DIOUSNESS. *s.* (from *incommodious.*) Inconvenience (*Burnet*).

INCOMMO'DITY. *s.* (*incommodité*, Fr.) Inconvenience; trouble (*Wotton*).

INCOMMUNICABI'LITY. *s.* (from *incommunicable.*) The quality of not being impartible.

INCOMMU'NICABLE. *a.* (*incommunicable*, French.) 1. Not impartible; not to be made the common right, property, or quality of more than one (*Stillingfleet*). 2. Not to be expressed; not to be told (*South*).

INCOMMU'NICABLY. *ad.* (from *incommunicable.*) In a manner not to be imparted or communicated (*Hakewill*).

INCOMMU'NICATING. *a.* (*in* and *communicating.*) Having no intercourse with each other (*Hale*).

INCOMPA'CT. } *a.* (*in* and *compact.*) INCOMPA'CTED. } Not joined; not cohering (*Boyle*).

INCO'MPARABLE. *a.* (*incomparable*, Fr.) Excellent above compare; excellent beyond all competition (*Sidney. Dryden*).

INCO'MPARABLY. *ad.* (from *incomparable.*) 1. Beyond comparison; without competition (*Hooker*). 2. Excellently; to the highest degree (*Addison*).

INCOMPA'SSIONATE. *a.* (*in* and *compassionate.*) Void of pity, or tenderness.

INCOMPATIBI'LITY. *s.* (properly *incompetibility*, *in* and *competo*, Latin.) Inconsistency of one thing with another (*Hale*).

INCOMPA'TIBLE. *a.* (rather *incompetible*, as it is sometimes written; *in* and *competo*, Latin.) Inconsistent with something else; such as cannot subsist or cannot be possessed together with something else (*Suckling*).

INCOMPA'TIBLY. *ad.* (for *incompetibly*, from *incompatible.*) Inconsistently.

INCO'MPETENCY. *s.* (*incompetence*, Fr.) Inability; want of adequate ability or qualification (*Boyle*).

INCO'MPETENT. *a.* (*in* and *competent*, Fr.) Not suitable; not adequate; not proportionate (*Dryden*).

INCO'MPETENTLY. *ad.* (from *incompetent.*) Unsuitably; unduly.

INCOMPLE'TE. *a.* (*in* and *complete.*) Not perfect; not finished (*Hooker*).

INCOMPLETE FLOWER, in botany. *Qui caret perianthio aut corolla.* An incomplete flower is destitute either of the perianth or coroll. In Delin. Pl. it is made synonymous with apetalous, as it is also by Vaillant. See IMPERFECT. Every apetalous flower is incomplete; but every incomplete flower is not apetalous. An imperfect flower wants one or both the essential parts; an incomplete flower wants one or both the covers.

INCOMPLE'TENESS. *s.* (from *incomplete.*) Imperfection; unfinished state (*Boyle*).

INCOMPLI'ANCE. *s.* (*in* and *compliance.*) 1. Untractableness; impracticableness; contradictious temper (*Tillotson*). 2. Refusal of compliance (*Rogers*).

INCOMPO'SED. *a.* (*in* and *composed.*) Disturbed; discomposed; disordered (*Howel*).

INCOMPO'SITE NUMBERS. See PRIMES.

INCOMPOSSIBI'LITY. *s.* (from *incompossible.*) Quality of being not possible but by the negation or destruction of something (*More*).

INCOMPO'SSIBLE. *a.* (*in*, *con*, and *possible.*) Not possible together; not possible but by the negation of something else.

INCOMPREHENSIBI'LITY. *s.* (*incomprehensibilité*, Fr.) Unconceivableness; superiority to human understanding.

INCOMPREHE'NSIBLE. *a.* (*incomprehensible*, French.) 1. Not to be conceived; not to be fully understood (*Hammond*). 2. Not to be contained (*Hooker*).

INCOMPREHE'NSIBLENESS. *s.* (from *incomprehensible.*) Unconceivableness (*Watts*).

INCOMPREHE'NSIBLY. *ad.* (from *incomprehensible.*) In a manner not to be conceived (*Locke*).

INCOMPRE'SSIBLE. *a.* (*incompressible*, Fr.) Not capable of being compressed into less space (*Cheyne*).

INCOMPRESSIBI'LITY. *s.* (from *incompressible.*) Incapacity to be squeezed into less room.

Water was, during a very long period, considered as a fluid perfectly unelastic; that is, unyielding, or incompressible; and this opinion was corroborated by an experiment of the Academy del Cimento in Italy. About a century and a half ago, the members of that academy endeavoured to ascertain whether water was capable of being compressed in any degree. For this purpose they filled a hollow metallic sphere with that fluid, and stopped the aperture very accurately. This ball then was pressed in a proper machine, but no contraction could be observed, nor, indeed, was the apparatus capable of manifesting small degrees of compression. Hence they concluded that water was not capable of compression. This opinion prevailed until the year 1761, when the ingenious Mr. Canton discovered the compressibility of water, and of other liquids, which he immediately made known to the Royal Society. He took a glass tube, hav-

ing a ball at one end, filled the ball and part of the tube with water, which he had deprived of air as much as it was in his power; then placed the glass thus filled under the receiver of an air-pump; and on exhausting the receiver, which removed the pressure of the atmosphere from over the water and the glass vessel which contained it, in consequence of which the water rose a little way into the tube, viz. expanded itself. He then placed the apparatus under the receiver of a condensing engine, and on forcing the air into it, which increased the pressure upon the water, a diminution of bulk evidently took place; the water descending a little way within the tube. "In this manner," Mr. Canton says, "I have found by repeated trials, when the heat of the air has been about 50°, and the mercury at a mean height in the barometer, that the water will expand and rise in the tube by removing the weight of the atmosphere, one part in 21740, and will be as much compressed under the weight of an additional atmosphere. Therefore the compression of water by twice the weight of the atmosphere is one part in 10870." "Water has the remarkable property of being more compressible in winter than in summer, which is contrary to what I have observed both in spirits of wine and oil of olives." By the same means, and in the same circumstances, Mr. Canton ascertained the property of being compressed in some other fluids, and the results are as in the following table:

		Millionth part.
Compression of	spirit of wine,	66
———	oil of olives,	48
———	rain water,	46
———	sea water,	40
———	mercury,	3

INCONCU'RRING. *a.* (*in* and *concur.*) Not concurring (*Brown*).

INCONCE'ALABLE. *a.* (*in* and *conceal.*) Not to be hid; not to be kept secret (*Br.*)

INCONCEI'VABLE. *a.* (*inconceivable*, Fr.) Incomprehensible; not to be conceived by the mind (*Newton*).

INCONCEI'VABLY. *ad.* (from *inconceivable.*) In a manner beyond comprehension (*South*).

INCONCE'PTIBLE. *a.* (*in* and *conceptible.*) Not to be conceived; incomprehensible; inconceivable: not used (*Hale*).

INCONCLU'DENT. *a.* (*in* and *concludens*, Lat.) Inferring no consequence (*Ayliffe*).

INCONCLU'SIVE. *a.* (*in* and *conclusive.*) Not enforcing any determination of the mind; not exhibiting cogent evidence.

INCONCLU'SIVELY. *ad.* Without any such evidence as determines the understanding.

INCONCLU'SIVENESS. *s.* (from *inconclusive.*) Want of rational cogency (*Locke*).

INCONCO'CT. } INCONCO'CTED. } *a.* (*in* and *concoct*). Unripened; immature; not fully digested (*Hale*).

INCONCO'CTION. *s.* (from *inconcoct.*) The state of being indigested (*Bacon*).

INCO'NDITE. *a.* (*inconditus*, Lat.) Irregular; rude; unpolished (*Phillips*).

INCONDI'TIONAL. *a.* (*in* and *conditional.*) Having no exception, or limitation (*Brown*).

INCONDI'TIONATE. *a.* (*in* and *condition.*) Not limited; not restrained by any conditions; absolute (*Boyle*).

INCONFO'RMITY. *s.* (*in* and *conformity.*) Incompliance with the practice of others (*Hooker*).

INCONFU'SION. *s.* (*in* and *confusion*). Distinctness; not used (*Bacon*).

INCO'NGRUENCE. *s.* (*in* and *congruence.*) Unsuitableness; want of adaptation (*Boyle*).

INCONGRU'ITY. *s.* (*incongruité*, French.) 1. Unsuitableness of one thing to another (*Stillingfleet*). 2. Inconsistency; inconsequence; absurdity; impropriety (*Dryden*). 3. Disagreement of parts; want of symmetry (*Donne*).

INCO'NGRUOUS. *a.* (*incongru*, French.) 1. Unsuitable; not fitting (*Stillingfleet*). 2. Inconsistent; absurd.

INCO'NGRUOUSLY. *ad.* (from *incongruous*). Improperly; unfitly.

INCONNE'XEDLY. *ad.* (*in* and *connex.*) Without any connexion or dependance (*Br.*)

INCO'NSCIONABLE. *a.* (*in* and *conscionable.*) Void of the sense of good and evil (*Spenser*).

INCO'NSEQUENCE. *s.* (*inconsequence*, French.) (*inconsequentia*, Lat.) Inconclusiveness; want of just inference (*Stillingfleet*).

INCO'NSEQUENT. *a.* (*in* and *consequens*, Latin.) Without just conclusion; without regular inference (*Brown*).

INCONSI'DERABLE. *a.* (*in* and *considerable.*) Unworthy of notice; unimportant (*Rogers*).

INCONSI'DERABLENESS. *s.* (from *inconsiderable.*) Small importance (*Tillotson*).

INCONSI'DERATE. *a.* (*inconsideratus*, Lat.) 1. Careless; thoughtless; negligent; inattentive; inadvertent (*Donne*). 4. Wanting due regard (*Decay of Piety*).

INCONSI'DERATELY. *ad.* Negligently; thoughtlessly; inattentively (*Addison*).

INCONSI'DERATENESS. *s.* (from *inconsiderate.*) Carelessness; thoughtlessness; negligence; inadvertence (*Tillotson.*)

INCONSIDERA'TION. *s.* (*inconsideration*, Fr.) Want of thought; inattention; inadvertence (*Taylor*).

INCONSI'STENCE. } INCONSI'STENCY. } *s.* (from *inconsistent.*) 1. Such opposition as that one proposition infers the negative of the other; such contrariety that both cannot be together (*South*). 2. Absurdity in argument or narration; argument or narrative, where one part destroys the other; self-contradiction. 3. Incongruity (*Swift.*) 4. Unsteadiness; changeableness.

INCONSI'STENT. *a.* (*in* and *consistent.*) 1. Incompatible; incongruous (*Clarendon.*) 2. Contrary (*Locke*). 3. Absurd.

INCONSISTENTLY. *ad.* Absurdly; incongruously; with self-contradiction.

INCONSI'STING. *a.* (*in* and *consist.*) Not consistent; incompatible with (*Dryden*).

INCONSO'LABLE. *a.* (*inconsolable*, Fr.) Not to be comforted; sorrowful beyond susceptibility of comfort (*Fiddes*).

INCO'NSONANCY. *s.* (*in* and *consonancy.*) Disagreement with itself.

INCONSPI'CUOUS. *a.* (*in* and *conspicuous.*) Indiscernible; not perceptible by the sight.

INCO'NSTANCY. *s.* (*inconstantia*, Latin.) Unsteadiness; want of steady adherence; mutability of temper or affection. (*Woodw.*)

INCO'NSTANT. *a.* (*inconstans*, Latin.) 1. Not firm in resolution; not steady in affection; wanting perseverance (*Sidney*). 2. Changeable; mutable; variable. (*Shak.*)

INCONSU'MABLE. *a.* (*in* and *consume.*) Not to be wasted (*Brown*).

INCONSU'MPTIBLE. *a.* (*in* and *consumptus*, Latin.) Not to be spent; not to be brought to an end; not to be consumed by fire (*Digby*).

INCONTE'STABLE. *a.* (*incontestable*, Fr.) Not to be disputed; not admitting debate; uncontrovertible (*Locke*).

INCONTE'STABLY. *ad.* (from *incontestable.*) Indisputably; uncontrovertibly.

INCONTI'GUOUS. *a.* (*in* and *contiguous.*) Not touching each other; not joined together (*Boyle*).

INCO'NTINENCE. } INCO'NTINENCY. } *s.* (*incontinentia*, Latin.) Inability to restrain the appetites; unchastity (*Milton*).

Inco'ntinence, in the eye of law, is of divers kinds; as in cases of bigamy, rapes, sodomy, or buggery, getting bastards; all which are punished by statute. See 25 Hen. VIII. cap. 6. 18 Eliz. cap. 7. 1 Jac. I. cap. 11. Incontinency of priests is punishable by the ordinary, by imprisonment, &c. 1 Hen. VII. cap. 4.

Inco'ntinence, in medicine, signifies an inability in any of the organs to retain what should not be discharged without the concurrence of the will. But incontinence is most frequently used with regard to an involuntary discharge of urine.

INCO'NTINENT. *a.* (*incontinens*, Latin.) 1. Unchaste; indulging unlawful pleasure. 2. Shunning delay; immediate: obsolete (*Spenser*).

INCO'NTINENTLY. *ad.* 1. Unchastely; without restraint of the appetites. 2. Immediately; at once: obsolete (*Spenser*).

INCONTROVE'RTIBLE. *a.* (*in* and *controvertible.*) Indisputable; not to be disputed.

INCONTROVE'RTIBLY. *ad.* To a degree beyond controversy or dispute (*Brown*).

INCONVE'NIENCE. } INCONVE'NIENCY. } *s.* (*inconvenient*, French.) 1. Unfitness; inexpedience (*Hooker*). 2. Disadvantage; cause of uneasiness; difficulty (*Tillotson*).

INCONVE'NIENT. *a.* (*inconvenient*, Fr.) 1. Incommodious; disadvantageous (*Small*). 2. Unfit; inexpedient (*Hooker*).

INCONVE'NIENTLY. *ad.* 1. Unfitly; incommodiously. 2. Unseasonably. (*Ains.*)

INCONVE'RSABLE. *a.* (*in* and *conversable.*) Incommunicative; unsocial (*More*).

INCONVE'RTIBLE. *a.* (*in* and *convertible.*) Not transmutable; incapable of change (*Brown*).

INCONVI'NCIBLE. *a.* (*in* and *convincible.*) Not to be convinced.

INCONVI'NCIBLY. *ad.* (from *inconvincible.*) Without admitting conviction (*Brown.*)

INCO'NY. *a.* (from *in* and *conn*, to know.) 1. Unlearned; artless. 2. In Scotland it denotes mischievously unlucky.

INCO'RPORAL. *a.* (*in* and *corporal.*) Immaterial; distinct from matter; distinct from body (*Raleigh*).

INCORPORA'LITY. s. (*incorporalité*, Fr.) Immaterialness; distinctness from body.

INCO'RPORALLY. *ad.* (from *incorporal.*) Without matter; immaterially.

To INCO'RPORATE. *v. a.* (*incorporer*, Fr.) 1. To mingle different ingredients so that they shall make one mass (*Bacon*). 2. To conjoin inseparably. (*Shak.*) 3. To form into a corporation, or body politic (*Carew*). 4. To unite; to associate (*Addison*). 5. To work into another mass (*Temple*). 6. To embody (*Stillingfleet*).

To Inco'rporate. *v. n.* To unite with something else (*Boyle*).

Inco'rporate. *a.* (*in* and *corporate.*) Immaterial; unbodied: not used (*Raleigh*).

INCORPORA'TION. *s.* (*incorporation*, Fr.) 1. Union of divers ingredients in one mass. 2. Formation of a body politic. 3. Adoption; union; association (*Hooker*).

INCORPO'REAL. *a.* (*incorporalis*, Latin; *incorporel*, French.) Immaterial; unbodied (*Bacon*).

INCORPO'REALLY. *ad.* Immaterially; without body (*Bacon*).

INCORPORE'ITY. *s.* (*in* and *corporeity.*) Immateriality; distinctness from body.

To INCO'RPSE. *v. a.* (*in* and *corpse.*) To incorporate: not used. (*Shak.*)

INCORRE'CT. *a.* (*in* and *correct.*) Not nicely finished; not exact; inaccurate (*Pope*).

INCORRE'CTLY. *ad.* Inaccurately; not exactly.

INCORRE'CTNESS. *s.* (*in* and *correctness.*) Inaccuracy; want of exactness.

INCO'RRIGIBLE. *a.* (*incorrigible*, Fr.) Bad beyond correction; depraved beyond amendment by any means (*Swift*).

INCO'RRIGIBLENESS. *s.* (from *incorrigible.*) Hopeless depravity; badness beyond all means of amendment (*Locke.*)

INCO'RRIGIBLY. *ad.* (from *incorrigible.*) To a degree of depravity beyond all means of amendment (*Roscommon*).

INCORRU'PT. } INCORRU'PTED. } *a.* (*in* and *corruptus*, Latin; *incorrompu*, Fr.) 1. Free from foulness or depravation

(*Milton*). 2. Pure of manners; honest; good.

INCORRUPTIBI'LITY. *s.* (*incorruptibilité*, French.) Insusceptibility of corruption; incapacity of decay (*Hakewill*).

INCORRU'PTIBLE. *a.* (*incorruptible*, Fr.) Not capable of corruption; not admitting decay (*Wake.*)

INCORRU'PTION. *s.* (*incorruption*, Fr.) Incapacity of corruption (*Cor.*)

INCORRU'PTNESS. *s.* (from *incorrupt.*) 1. Purity of manners; honesty; integrity (*Woodward*). 2. Freedom from decay or degeneration.

To INCRA'SSATE. *v. a.* (*in* and *crassus*, Lat.) To thicken; the contrary to attenuate (*Brown. Newton*).

INCRA'SSATED peduncle. In botany, a peduncle thickening or becoming thicker towards the flower. As in Cotula, Tragopogon, and most cernuous flowers. Opposed to attenuate. It is applied also to the scape.

INCRASSA'TION. *s.* (from *incrassate.*) 1. The act of thickening. 2. The state of growing thick (*Brown*).

INCRA'SSATIVE. *a.* (from *incrassate.*) Having the quality of thickening (*Harvey*).

To INCRE'ASE. *v. n.* (*in* and *cresco*, Lat.) 1. To grow more or greater; to advance in quantity of value (*Prior*). 2. To be fertile (*Hale*).

To INCREASE. *v. a.* To make more or greater (*Temple*).

INCREA'SE. *s.* (from the verb.) 1. Augmentation; the state of growing more or greater ((*Pope*). 2. Increment; that which is added to the original stock (*Leviticus*). 3. Produce (*Denham*). 4. Generation (*Shaks.*) 5. Progeny (*Pope*). 6. The state of waxing (*Bacon*).

INCRE'ASER. *s.* (from *increase.*) He who increases.

INCREA'TED. *a.* Not created (*Cheyne*).

INCREDIBI'LITY. *s.* (*incredibilité*, Fr.) The quality of surpassing belief (*Dryden*).

INCRE'DIBLE. *a.* (*incredibilis*, Latin.) Surpassing belief; not to be credited (*Raleigh*).

INCRE'DIBLENESS. *s.* (from *incredible.*) Quality of being not credible.

INCRE'DIBLY. *ad.* (from *incredible.*) In a manner not to be believed.

INCREDU'LITY. *s.* (*incredulité*, French.) Quality of not believing; hardness of belief (*Raleigh*).

INCREDU'LOUS. *a.* (*incredule*, Fr. *incredulous*, Latin.) Hard of belief; refusing credit (*Bacon*).

INCRE'DULOUSNESS. *s.* (from *incredulous.*) Hardness of belief; incredulity.

INCRE'MABLE. *a.* (*in* and *cremo*, Latin.) Not consumable by fire (*Brown*).

I'NCREMENT. *s.* (*incrementum*, Latin.) 1. Act of growing greater (*Brown*). 2. Increase; matter added (*Woodward*). 2. Produce (*Philips*).

I'NCREMENT, in mathematics, the small increase of a variable quantity. Newton, in his Treatise on Fluxions, calls these by the name *moments*, and observes, that they are proportional to the velocity or rate of increase of the variable quantities in an indefinitely small time.

I'NCREMENTS, METHOD OF, a branch of analytics, in which a calculus is founded on the properties of the successive values of variable quantities, and their differences or increments.

This method was invented by Dr. Brook Taylor, who published a treatise upon it in 1715, and who farther explained it in the Philosophical Transactions. It is nearly allied to the method of fluxions, and indeed arises out of it: in many respects it is of the same nature as the differential method, but is more general. It is very useful in different mathematical pursuits; but more particularly in the summation of series, where it is of very ready and extensive application.

In this method any variable quantity is called an *integral*. The magnitude by which it is increased at one step is called the *increment*. Thus, $1+2+3 \ldots\ldots\ldots + m = m.\frac{m+1}{2}$, and the magnitude by which it increases at one step is $m+1$, which is called the increment of the integral $m.\frac{m+1}{2}$. When the quantity decreases, the increment becomes negative. The increase of any increment, is the *second increment*; the increase of the second increment, is the *third increment*, and so on.

Notation. Simple integral quantities are denoted by any letters whatever, as z, y, x, u. The several successive values of a simple integral, are denoted by the same letter with small figures under it, as $z, \underset{1}{z}, \underset{2}{z}$, &c. are the present value, the 1st, 2d, &c. successive values, &c.: the preceding values have negative marks placed before the figures, as $\underset{-1}{z}, \underset{-2}{z}$, &c. The increments are denoted by the same letters with either points under them, or dashes above them: thus $\underset{.}{x}$ or x' is the increment of x; the latter method is in most general use. Second, third, &c. increments are denoted by 2, 3, or more dashes, or dots, as x'', x''', &c. or $\underset{..}{x}$, $\underset{\vdots}{x}$, &c. If x be any increment, its integral is marked thus $[x]$; and ${}^2[x]$ denotes the integral of $[x]$.

If any two quantities begin to increase together, and their corresponding increments be always in the same ratio, their integrals, or the whole quantities generated, will be in that ratio.

If an integral be represented by the pro-

duct of quantities in arithmetical progression, as $m.\overline{m+r}.\ \overline{m+2r}.\ \overline{m+3r}\ .\ .\ .\ .\ .\ \overline{m+\overline{n-1}.r}$, where r is constant, and m is increased at every step by r, the increment of this integral is $nr\times\overline{m+r}.\ \overline{m+2r}.\ \overline{m+3r}\ .\ .\ .\ .\ .\ \overline{m+\overline{n-1}.r}$. And since an invariable quantity C has no increment; if such quantity be added to, or taken from, the above quantities, the increment of the whole will remain the same. Hence, if the increment of an integral be represented by $nr\times\overline{m+r}.\ \overline{m+2r}.\ \overline{m+3r}\ .\ .\ .\ .\ \overline{m+\overline{n-1}.r}$, the integral is $m.\overline{m+r}.\ \overline{m+2r}.\ \overline{m+3r}\ .\ .\ .\ .\ \overline{m+\overline{n-1}.r}\pm C$; where the invariable quantity C. must be determined by the nature of the question.

To find, therefore, the integral of any increment, let the increment be reduced to the products of arithmetical progressionals, whose common difference is the quantity by which the variable magnitude is increased at every step, and the integral of each increment will be found by multiplying it by the preceding term in the progression, and dividing it by the number of terms thus increased, and by the common difference. This result is to be increased or lessened by the constant quantity C: thus, when x, the integral obtained by the rule, is a, suppose the true integral is known to be b; then since $x+C$ is in all cases the integral, and $a+C=b$, or $C=b-a$, therefore the correct integral is $x+b-a$.

Though in general it is convenient to reduce an increment to the product of arithmetical progressionals, in order to obtain its integral; yet, if a quantity of any other form can be found, whose increment coincides with that proposed, this quantity, when properly corrected, is the integral. *Ex.* Find the sum of n terms of the series $5+6+7$, &c. Let $An+Bn^2+Cn^3+$, &c. be the sum required; its increment is $A.\overline{n+1}+B.\overline{n+1}^2+C.\overline{n+1}^3$, &c.—$An-Bn^2$ Cn^3, &c.; and the increment of the sum is also $n+5$; therefore $A+2Bn+B+3Cn^2+3Cn+C+$ &c.$=n+5$; and by equating the co-efficients, $C=o$; $2B=1$, or $B=\frac{1}{2}$; $A+B=5$, or $A=\frac{9}{2}$; hence, the sum required is $\frac{9n+n^2}{2}$, which needs no correction.

Those who wish to prosecute this subject farther, are referred to Wood's Algebra, Emerson's Increments, Hutton's Dict. art Increments, Simpson's Exercises, Taylor's Method. Increment. and Waring's Medita. Analyt. lib. 2.

To I'NCREPATE. *v. a.* (*increpo*, Latin.) To chide; to reprehend.

INCREPA'TION. *s.* (*increpatio*, Latin.) Reprehension; chiding (*Hammond*).

To INCRU'ST. } *v. a.* (*incrusto*, Lat.)
To INCRU'STATE. } To cover with an additional coat adhering to the internal matter (*Pope. Cheyne*).

IMCRUSTA'TION. *s.* (*incrustation*, Fr.) An adherent covering; something superinduced (*Addison*).

To I'NCUBATE. *v. n.* (*incubo*, Latin.) To sit upon eggs.

INCUBA'TION, in ornithology, that part of the general process of ovation which consists in the sitting of the hen upon her eggs, in order to hatch them. See OVATION.

I'NCUBUS, (*Incubus*, *i*, m. from *incubo*, to lie upon, because the patient fancies that something lies upon his chest.) See NIGHTMARE, and ONEIRODYNIA GRAVENS. This disease was denominated by the Greek physicians *Ephialtes*, a term still continued in Sauvages and some other nosologists.

To INCU'LCATE. *v. a.* (*inculco*, Lat.) To impress by frequent admonitions (*Broome*).

INCULCA'TION. *s.* (from *inculcate*.) The act of impressing by frequent admonition.

INCU'LPABLE. *a.* (*in* and *culpabilis*, Lat.) Unblamable; not reprehensible (*South*).

INCU'LPABLY. *ad.* (*in* and *culpabilis*, Lat.) Unblamably; without blame (*South*).

INCU'LT. *a.* (*inculte*, Fr. *incultus*, Latin.) Uncultivated; untilled (*Thomson*).

INCU'MBENCY. *s.* (from *incumbent*.) 1. The act of lying upon another. 2. The state of keeping a benefice. (*Swift*).

INCU'MBENT. *a.* (*incumbens*, Latin.) 1. Resting upon; lying upon (*Boyle*). 2. Imposed as a duty (*Sprat*).

INCU'MBENT. *Incumbens.* In botany, leaning upon, or resting against. Applied to the stamens in the class diadelphia; to anthers, which rest upon the filament: opposed to upright, *erecta;* to the divisions of leaves which lie one over another.

INCU'MBENT, a clerk, or minister, who is resident on his benefice: he is called incumbent, because he does, or at least ought to *bend* his whole study to discharge the cure of his church.

To INCU'MBER. *v. a.* (*encombrer*, Fr.) To embarrass (*Dryden*).

To INCU'R. *v. a.* (*incurro*, Latin.) 1. To become liable to a punishment or reprehension (*Hayward*). 2. To occur; to press on the senses (*South*).

INCURABI'LITY. *s.* (*incurabilité*, Fr.) Impossibility of cure; utter insusceptibility of remedy (*Harvey*).

INCU'RABLE. *a.* (*incurable*, French.) Not admitting remedy; not to be removed by medicine; irremediable; hopeless. (*Sw.*)

INCU'RABLENESS. *s.* (from *incurable*.) State of not admitting any cure.

INCU'RABLY. *ad.* (from *incurable*.) Without remedy (*Locke*).

INCU'RIOUS. *a.* (*in* and *curious*.) Negligent; inattentive (*Derham*).

INCU'RSION. *s.* (from *incurro*, Latin.) 1. Attack; mischievous occurrence (*South*). 2. (*Incursion*, French.) Invasion without conquest; inroad; ravage (*Bacon*).

To INCU'RVATE. *v. a.* (*incurvo*, Latin.) To bend; to crook (*Cheyne*).

INCU'RVATE STEM. In botany, an incurved stem. *Introrsum nutans.* Delin. Pl. bowed or curved inwards; incurvate leaf; dum sursum arcuatur versus caulem; bowed or curved upwards towards the stem. Made to be synonymous with inflexum in Philos. Bot.; aculeus incurvus; introrsum flexus; a prickle, bowed or bent inwards. The terms for angular and curvi-linear bendings ought to be distinct; bent should be applied to the first, and bowed or curved to the second.

INCURVA'TION. *s.* (from *incurvate.*) 1. The act of bending or making crooked. 2. State of being bent; curvity; crookedness (*Glanville*). 3. Flexion of the body in token of reverence (*Stillingfleet*).

INCU'RVITY. *s.* (from *incurvus*, Latin.) Crookedness; the state of bending inward (*Brown*).

INCUS, (*Incus*, *udis*, f. a smith's anvil, from *incudo*, to smite upon; so named from its likeness in shape to an anvil.) The largest and strongest of the bones of the ear in the tympanum. It is divided into a body and two crura. Its body is situated anteriorly, is rather broad than thick, and has two eminences and two depressions, both covered with cartilage, and intended for the reception of the head of the malleus. Its shorter crus extends no farther than the cells of the mastoid apophysis. Its longer crus, together with the manubrium of the malleus, to which it is connected by a ligament, is of the same extent as the shorter, but its extremity is curved inwards to receive the os orbiculare, by the intervention of which it is united with the stapes.

To I'NDAGATE. *v. a.* (*indago*, Lat.) To search; to beat out.

INDAGA'TION. *s.* (from *indagate.*) Search; inquiry; examination (*Boyle*).

INDAGA'TOR. *s.* (*indagator*, Latin.) A searcher; an inquirer; an examiner (*Boyle*).

To INDA'RT. *v. a.* (*in* and *dart.*) To dart in; to strike in. (*Shak.*)

To INDE'BT. *v. a.* 1. To put in debt. 2. To oblige; to put under obligation (*Milton*).

INDE'BTED. *participial a.* (*in* and *debt.*) Obliged by something received; bound to restitution; having incurred a debt (*Hook.*)

INDE'CENCY. *s.* (*indecence*, Fr.) Any thing unbecoming; any thing contrary to good manners; something wrong, but scarce criminal (*Locke*).

INDE'CENT. *a.* (*indecent*, Fr.) Unbecoming; unfit for the eyes or ears (*South*).

INDE'CENTLY. *ad.* Without decency; in a manner contrary to decency.

INDECI'DUOUS. *a.* (*in* and *deciduous.*) Not falling; not shed; not liable to a yearly fall of the leaf; evergreen (*Brown*).

INDECLI'NABLE. *a.* (*indeclinabilis*, Lat.) Not varied by terminations (*Arbuthnot*).

INDECO'ROUS. *a.* (*indecorus*, Latin.) Indecent; unbecoming (*Norris*).

INDECO'RUM. *s.* (Latin.) Indecency; something unbecoming (*Young*).

INDE'ED. *ad.* (*in* and *deed.*) 1. In reality; in truth; in verity (*Sidney*). 2. Above common rate (*Davies*). 3. This is to be granted that: *he is wise* indeed, *but he is not happy* (*Wake*). 4. It is used as a slight assertion or recapitulation in a sense hardly perceptible or explicable: *I said I thought it a confederacy, though* indeed *I had no reason so to think* (*Bacon*). 5. It is used to note concessions in comparisons; *he is a greater man* indeed, *but not a better* (*Bacon*).

INDEFA'TIGABLE. *a.* (*indefatigabilis*, Latin.) Unwearied; not tired; not exhausted by labour (*South*).

INDEFA'TIGABLY. *ad.* (from *indefatigable.*) Without weariness (*Dryden*).

INDEFECTIBI'LITY. *s.* (from *indefectible.*) The quality of suffering no decay; of being subject to no defect.

INDEFE'CTIBLE. *a.* (*in* and *defectus*, Latin.) Unfailing; not liable to defect or decay.

INDEFE'ISIBLE. *a.* (*indefaisible*, French.) Not to be cut off; not to be vacated; irrevocable (*Decay of Piety*).

INDEFE'NSIBLE. *a.* (*in* and *defensus*, Latin.) What cannot be defended or maintained (*Sandys*).

INDE'FINITE. *a.* (*indifinitus*, Latin.) 1. Not determined; not limited; not settled (*Bacon*). 2. Large beyond the comprehension of man, though not absolutely without limits (*Spectator*).

INDE'FINITE is also used in the schools to signify a thing that has but one extreme; for instance, a line drawn from any point and extended infinitely.

INDE'FINITE, in grammar, is understood of nouns, pronouns, verbs, participles, articles, &c. which are left in an uncertain indeterminate sense, and not fixed to any particular time, thing, or other circumstance.

INDE'FINITELY. *ad.* 1. Without any settled or determinate limitation (*Hooker*). 2. To a degree indefinite (*Ray*).

INDEFI'NITUDE. *s.* (from *indefinite.*) Quantity not limited by our understanding, though yet finite (*Hale*).

INDELI'BERATE. } *a.* (*in* and *delibe-*
INDELI'BERATED. } *rate.*) Unpremeditated; done without consideration (*Bramhall*).

INDE'LIBLE. *a.* (*indelibilis*, Latin.) 1. Not to be blotted out or effaced (*Gay*). 2. Not to be annulled (*Sprat*).

INDE'LICACY. *s.* (*in* and *delicacy.*) Want of delicacy; want of elegant decency. (*Add.*)

INDE'LICATE. *a.* (*in* and *delicate.*) Wanting decency; void of a quick sense of decency.

INDEMNIFICA'TION. *s.* (from *indemnify.*) 1. Security against loss or penalty. 2. Reimbursement of loss or penalty.

To INDE'MNIFY. *v. a.* (*in* and *demnify.*) 1. To secure against loss or penalty. 2. To maintain unhurt (*Watts*).

INDE'MNITY. *s.* (*indemnité*, Fr.) Security from punishment; exemption from punishment (*K. Charles*).

To INDE'NT. *v. a.* (*in* and *dens*, a tooth, Latin.) To mark any thing with inequality like a row of teeth; to cut in and out; to make to wave or undulate (*Woodward*).

To INDE'NT. *v. n.* (from the method of cutting counterparts of a contract together.) To contract; to bargain; to make a compact (*Decay of Piety*).

INDE'NT. *s.* (from the verb.) Inequality; incisure; indentation (*Shak.*).

INDENTA'TION. *s.* (*in* and *dens*, Latin.) An indenture; waving in any figure (*Woodward*).

INDE'NTED, in heraldry, is when the out-line of an ordinary is notched like the teeth of a saw.

INDE'NTED LINE, in fortification, the same with what the French engineers call redent, being a trench and parapet running out and in, like the teeth of a saw; and is much used in irregular fortification.

INDE'NTURE, is a writing, containing a conveyance between two or more, indented or cut unevenly, or in and out, on the top or side, answerable to another writing that likewise comprehends the same words. Formerly when deeds were more concise than at present, it was usual to write both parts on the same piece of parchment, with some words or letters written between them, through which the parchment was cut, either in a straight or indented line, in such a manner as to leave half the word on one part, and half on the other; and this custom is still preserved in making out the indentures of a fine. But at last, indenting only hath come into use, without cutting through any letters at all, and it seems at present to serve for little other purpose, than to give name to the species of the deed: as an apprentice's indenture.

INDEPE'NDENCE. } INDEPE'NDENCY. } *s.* (*Independance*, Fr.) Freedom; exemption from reliance or control; state over which none has power (*Addison*).

INDEPE'NDENT. *a.* (*independant*, Fr.) 1. Not depending; not supported by any other; not relying on another; not controlled (*South*). 2. Not relating to any thing else, as to a superior cause or power. (*Bent.*)

INDEPE'NDENTS, a sect of protestants in England and Holland; so called, as denying not only any subordination among their clergy, but also all dependency on any other assembly.

They maintain that every separate church, or particular congregation, has in itself radically and essentially every thing necessary for its own government; that it has all ecclesiastical power and jurisdiction; and is not at all subject to other churches, or their deputies, nor to their assemblies, or synods.

Robinson, the founder of the sect, makes express use of this term in explaining his doctrine relating to ecclesiastical government: Cœtum quemlibet particularum (says he, in his Apologia, cap. 5. p. 22.) esse totam, integram et perfectam ecclesiam ex suis partibus constantem, immediate et independenter (quoad alias ecclesias) sub ipso Christo. It may probably have been from this very passage that the title of independents was originally derived. The disciples of Robinson, originally called Brownists, because John Robinson, the founder of this sect, was pastor of a congregation of Brownists that had settled at Leyden, did not reject the appellation of Independents. It was certainly utterly unknown in England before the year 1640; at least it is not once mentioned in the ecclesiastical canons and constitutions that were drawn up, during that year, in the synods or visitations held by the archbishops of Canterbury, York, and other prelates, in which canons all the various sects, that then subsisted in England, are particularly mentioned. See Wilkins's Concilia Magnæ Britanniæ et Hiberniæ, vol. iv. cap. 5. p. 548.

The first Independent, or congregational church in England, was set up in the year 1616, by Mr. Jacob, who had adopted the religious sentiments of Robinson. The Independents, though sprung originally from a congregation of Brownists, were much more commendable than the latter, both in the moderation of their sentiments, and the order of their discipline. The Brownists, or BARROWISTS, as we have already mentioned under that article, allowed all ranks and orders of men promiscuously to teach in public, and to perform the other pastoral functions; whereas the Independents had, and still have, a certain number of ministers, for the most part regularly educated, chosen respectively by the congregations where they are fixed; nor is any person among them permitted to speak in public, before he has submitted to a proper examination of his capacity and talents, and been approved of by the congregation to which he ministers. The charge alleged against them by our historian Rapin, (Hist. of England, vol. ii. p. 514. fol. ed.) who says, that they could not so much as endure ordinary ministers in the church, &c. is, therefore, evidently false and groundless. He was led into his mistake by confounding the Independents and Brownists. There are other charges, no less unjustifiable, that have been urged against the Independents, by this celebrated historian, and by others of less note. Rapin says, that, with regard to the state, they abhorred monarchy, and approved only a republican government. This might have been true with regard to several persons among the Independents, in common with

those of other sects; but it does not appear from any of their public writings, that republican principles formed the distinguishing characteristic of this sect. Rapin is farther mistaken, when he represents the religious principles of the Independents as contrary to those of all the rest of the world. It appears from two confessions of faith, one composed by Robinson, on behalf of the English Independents in Holland, and published at Leyden in 1619, entitled, Apologia pro exulibus Anglis, qui Brownistæ vulgo appellantur, and another drawn up in London in the year 1658, by the principal members of this community in England, entitled, A Declaration of the Faith and Order owned and practised in the congregational Churches in England, agreed upon and consented unto by their Elders and Messengers, in their Meeting at the Savoy, Oct. 12, 1658; as well as from other writings of the Independents, that they differed from the rest of the reformed in no single point of any consequence, except that of ecclesiastical government; and their religious doctrines were almost entirely the same with those that are adopted by the church of Geneva. During the administration of Cromwell, the Independents acquired very considerable reputation and influence; and he made use of them as a check to the ambition of the Presbyterians, who aimed at a very high degree of ecclesiastical power, and who had succeeded, soon after the elevation of Cromwell, in obtaining a parliamentary establishment of their own church government. But after the restoration of Charles II. their cause declined; and in the year 1691, under the reign of king William, they entered into an association with the Presbyterians residing in and about London, under certain heads of agreement, comprised in nine articles, that tended to the maintenance of their respective institutions. These may be found in the second volume of Whiston's Memoirs of his Life and Writings; and the substance of them in Mosheim.

At that time the Independents and Presbyterians, called from this association the United Brethren, were agreed with regard to doctrines, being generally Calvinists, and differed only with respect to ecclesiastical discipline. But at present, though the English Independents and Presbyterians form two distinct parties of Protestant Dissenters, they are distinguished by very trifling differences with regard to church government; and the denominations are more arbitrarily used to comprehend those who differ in theological opinions. The Independents are generally more attached to the tenets distinguished by the term Orthodoxy or Calvinism, than the Presbyterians.

The Independents have academies wherein young men are instructed for the ministry, at Hoxton, Homerton, Wymondley, Gosport, Rotherham, &c. They have produced several able writers, among whom we may mention Bates, Baxter, Henry, Watts, Doddridge, Jennings, Edwards, Calamy, Howe, Grosvenor, Orton, Towgood, Harmer, Grove, Robins, Addington, Conder, Parry, Palmer, Williams, Lavington, Bogue, Jay, J. P. Smith, Collyer, Styles, &c.

On the subject of this article, see Mosheim's Eccl. Hist. by Macleane, vol. iv. p. 522, &c. 8vo. Neal's Hist. of the Puritans, vol. ii. p. 107, &c. vol. iii. p. 547, &c. vol. iv. p. 187, &c. Burnet's Hist. of his Own Times, vol. i. p. 46, &c.

INDEPE'NDENTLY. *ad.* (from *independent.*) Without reference to other things (*Dryden*).

INDESE'RT. *s.* (*in* and *desert.*) Want of merit (*Addison*).

INDE'SINENTLY. *ad.* (*indesinenter*, Fr.) Without cessation (*Ray*).

INDESTRU'CTIBLE. *a.* (*in* and *destructible.*) Not to be destroyed (*Boyle*).

INDETE'RMINABLE. *a.* (*in* and *determinable.*) Not to be fixed; not to be defined or settled (*Brown*).

INDETE'RMINATE. *a.* (*indeterminé*, Fr.) Unfixed; not defined; indefinite (*Newton*).

INDETE'RMINATE, or INDETERMINED, in geometry, is understood of a quantity, which has no certain or definite bounds.

INDETE'RMINATE PROBLEM, is that which admits of innumerable different solutions, and sometimes perhaps only of a great many different answers; otherwise called an unlimited problem.

In problems of this kind, the number of unknown quantities concerned, is greater than the number of the conditions or equations by which they are to be found; from which it happens that generally some other conditions or quantities are assumed, to supply the defect, which being taken at pleasure, give the same number of answers as varieties in those assumptions.

Indeterminate problems were well treated by Diophantus in his Algebra: the later authors on this subject are Wallis, Kersey, La Grange, &c. See Kersey's Algebra, Simpson's and Emerson's, and particularly the 2d vol. of Euler's Algebra, where these problems are handled in a very masterly manner. A paper of Mr. Leslie's in vol. 2. Edin. Transac. or vol. 1. Math. Repository, may also be consulted with great advantage.

INDETE'RMINATELY. *ad.* Indefinitely; not in any settled manner (*Brown*).

INDETE'RMINED. *a.* (*in* and *determined.*) Unsettled; unfixed (*Locke*).

INDETERMINA'TION. *s.* (*in* and *determination.*) Want of determination. (*Bramh.*)

INDEVO'TION. *s.* (*indevotion*, Fr.) Want of devotion; irreligion (*Decay of Piety*).

INDEVO'UT. *a.* (*indevot*, Fr.) Not devout; not religious; irreligious (*Decay of Piety*).

INDE'X. *s.* (Latin.) 1. The discoverer;

the pointer out (*Arbuthnot*). 2. The hand that points to any thing, as to the hour or way (*Bentley*).

Inde'x, (*Index*, ĭ*cis*, c. g. from *indico*, to point out, because it is generally used for such purposes.) In anatomy. The fore finger.

Inde'x, in arithmetic, is the characteristic or the exponent of a logarithm; being that which shows of how many places the absolute or natural number belonging to the logarithm consists, and of what naturè it is, whether an integer or a fraction; the index being less by 1 than the number of integer figures in the natural number, and is positive for integer or whole numbers, but negative in fractions, or in the denominator of a fraction; and in decimals, the negative index is 1 more than the number of cyphers in the decimal, after the point, and before the first significant figure. Or, still more generally, the index shews how far the first figure of the natural number is distant from the place of units, either towards the left hand, as in whole numbers, or towards the right, as in decimals; these opposite cases being marked by the correspondent signs + and —, of opposite affections, the sign — being set over the index, and not before it, because it is this index only which is understood as negative, and not the decimal part of the logarithm. For example, when the natural number is varied with respect to the decimal places in it, as in the first of the two columns annexed, the indices of the respective logarithms vary, as in the second column. The affirmative indices are understood, but not expressed. See Logarithms.

Number.	Logarithm.
2651	3·4234097
265·1	2·4234097
26·51	1·4234097
2·651	0·4234097
·2651	$\bar{1}$·4234097
·02651	$\bar{2}$·4234097
·002651	$\bar{3}$·4234097

Inde'x of a Globe, is a little style fitted on to the north-pole, and turning round with it, pointing out the divisions of the hour-circle. In some globes the index is fixed on a wire that stands a little above the equator; and the hours and minutes are marked on that circle.

Inde'x of a Quantity, in arithmetic and algebra, otherwise called the exponent, is the number that shews to what power it is understood to be raised. See Exponent.

Inde'x, in literature, expresses that part of a work, or single volume, which is generally subjoined to its conclusion, and arranged in alphabetical order, with particular references to the pages where the respective matters or subjects are discussed.

An index should be distinguished from what is usually called, *Table of Contents*, which affords an analytical view of the different topics, progressively, while the index is extended to facilitate occasional reference. Both are useful: the former, to enable the reader to take a comprehensive survey of the whole work, and to appretiate at once the author's logical talents of dividing and arranging the subject of which he treats, as well as to form an idea of its extent and importance. In an economical respect, however, the latter is a more valuable addition to a book than an analysis of its contents, which are in a manner evident from the heads of chapters or sections; whereas an index tends to save time and labour, that are often unnecessarily wasted in searching for particular passages. Hence a large, ponderous volume, with an alphabetical index, may be aptly compared with an extensive street, or town, the houses of which are not provided with numbers.

One of the most laborious productions in this class, is Ayscough's "Index to the remarkable Passages and Words made use of by Shakspeare."

Inde'x (Expurgatory), a catalogue of prohibited books in the church of Rome. The first catalogues of this kind were made by the inquisitors; and these were afterwards approved of by the council of Trent, after some alteration was made in them by way of retrenchment or addition. Thus an index of heretical books being formed, it was confirmed by a bull of Clement VIII. in 1595, and printed with several introductory rules; by the fourth of which, the use of the Scriptures in the vulgar tongue is forbidden to all persons without a particular licence; and by the tenth rule it is ordained, that no book shall be printed at Rome without the approbation of the Pope's vicar, or some person delegated by the Pope; nor in any other places, unless allowed by the bishop of the diocese, or some person deputed by him, or by the inquisitor of heretical pravity.

The Trent index being thus published, Philip II. of Spain ordered another to be printed at Antwerp in 1571, with considerable enlargements. Another index was published in Spain in 1584; a copy of which was snatched out of the fire when the English plundered Cadiz.

INDEXTE'RITY. *s.* (*in* and *dexterity.*) Want of dexterity; want of readiness; clumsiness; awkwardness (*Harvey*).

INDIA Within Ganges. This country is situated between the latitudes of 6 and 34 degrees N. and between 65 and 91 degrees of E. longitude. A great part of this space is covered with the sea. India within Ganges is bounded on the N. by Usbec Tartary and part of Thibet; by the Indian Ocean on the S.; by Great Thibet, India beyond Gan-

ges, and the Bay of Bengal on the E.; and by Persia and the Indian Ocean on the W. The chief mountains are those of Caucasus, Naugracut, and Balagate, which run almost the whole length of India from N. to S. Many of the mountains produce diamonds, rubies, amethysts, and other precious stones. This great country, which is said to be extremely populous, contains inhabitants of various complexions, manners, and religions. The manufactures of India are chiefly muslin, calicoe, and silk. They have some merchant-ships of their own, and traffic with the countries bordering upon India, and particularly with Persia. The Europeans usually purchase most of their manufactures. See Hindustan.

India Beyond Ganges, is situated between the latitudes of 1 and 30 degrees N. and between the longitudes of 89 and 109 degrees E. Great part of these limits is covered by the sea. It is bounded on the N. by Thibet and China; by China and the Chinesian Sea on the E.; by the same sea and the Streights of Malacca on the S.; and by the Bay of Bengal and part of India on the W. In the north of this country the air is dry and healthful; but the southern provinces are very hot and moist, especially in the vallies and low lands near the sea and rivers.

India Company. See Company.

Indian Arrow Root, in botany. See Maranta.

Indian Corn, in botany. See Zea.

Indian Fig, in botany. See Cactus.

Indian Gad Tree, in botany. See Ficus.

Indian Mallow, in botany. See Sida.

Indian Oak, in botany. See Tectona.

Indian Reed, in botany. See Canna.

Indian Cress. See Nasturtium Indicum. and Trapœolum.

Indian Date Plum. The fruit of the Diospyros lotus of Linnéus. When ripe it has an agreeable taste, and is very nutritious. See Diospyros.

Indian Leaf. See Cassia Lignea.

Indian Pink. See Spigelia.

Indian Rubber. The substance known by the names Indian rubber, elastic gum, Cayenne resin, cautchoc, and by the French caoutchouc, is prepared from the juice of the Siphonia elastica, foliis ternatis elleptisis integerrimis subtus canis longe peliolatis. Suppl. plant. The manner of obtaining this juice is by making incisions through the bark of the lower part of the trunk of the tree, from which the fluid resin issues in great abundance, appearing of a milky whiteness as it flows into the vessel placed to receive it, and into which it is conducted by means of a tube or leaf fixed in the incision, and supported with clay. On exposure to the air this milky juice gradually inspissates into a soft, reddish, elastic resin. It is moulded by the Indians in South America into various figures, but is commonly brought to Europe in that of spear shaped bottles, which are said to be formed by spreading the juice of the Siphonia over a proper mould of clay; as soon as one layer is dry another is added, until the bottle be of the thickness desired. It is then exposed to a thick dense smoke, or to a fire, until it becomes so dry as not to stick to the fingers, when by means of certain instruments of iron or wood it is ornamented on the outside with various figures. This being done, it remains only to pick out the mould, which is easily effected by softening it with water. Indian rubber may be subjected to the action of some of the most powerful menstrua, without suffering the least change, while its pliability and elasticity are eminently peculiar to itself. Its proper menstruum is known to some persons in England, who keep it a profound secret, and prepare the gum into beautiful catheters, bougies, syringes, pessaries, &c. See Caoutchouc and Siphonia.

Indian Wheat. See Zea Mays.

Indian Grass. A substance used in angling, and without which many kinds of fishing lines cannot be complete. It consists of a fine thread or cord composed of the tendrils issuing from the ovary of the squalus canicula or dog-fish. See Squalus.

INDIANA, a tract of country situated on the Ohio, in the state of Virginia, claimed by William Trent, and others, as a compensation for losses sustained in the year 1768. This claim has been laid before congress, and in some degree allowed, but it does not appear to be yet finally determined.

Indians, the name by which the aborigines of America are generally called. These people are scattered through the extent of the two prodigious continents, and divided into an infinite number of nations and tribes; differing very little from each other in their manners and customs, and all from a very striking picture of antiquity. The Indians, or people of America, are tall and straight in their limbs, beyond the proportion of most nations. Their bodies are strong; but of such a species of vigour, as is rather adapted to endure much hardship than to continue long at any servile work: it is the strength of a beast of prey, rather than that of a beast of burthen. Their bodies and heads are flattish, the effect of art. Their features are regular, but their countenances fiercé; their hair long, black, lank, and as strong as that of a horse, but no beards. The colour of their skins a reddish brown, admired among them, and improved by the constant use of bear's fat and paint. Their only occupations are hunting and war; agriculture is left to the women; merchandise they despise. There are no people amongst whom the laws of hospitality are more sacred, or executed with more generosity and goodwill. But to the enemies of his country, or to those who have privately offended, the Indian is

implacable. No length of time is sufficient to allay his resentment; no distance of place great enough to protect the object. The Indians have scarce any temples among them; though we hear, indeed, of some, and those extremely magnificent, amongst the ancient Mexicans and Peruvians: but those were civilized nations; they hold the existence of a Supreme Being eternal and incorruptible, who has power over all. Satisfied with owning this, which is traditionary amongst them, they give him no sort of worship. Though without religion, they abound in superstitions; as it is common for those to do whose subsistence depends, like their's, upon fortune. Being great observers of omens and dreams, and pryers into futurity with great eagerness, they abound in diviners, augurs, and magicians, whom they rely much upon in all matters that concern them, whether of health, war, or hunting. Liberty, in its fullest extent, is the darling passion of the Indians: to this they sacrifice every thing. This is what makes a life of uncertainty and want supportable to them; and their education is directed in such a manner, as to cherish it to the utmost. This free disposition is general; and though some tribes are found in America with a head, whom we call king, his power is rather persuasive than coercive; and he is reverenced as a father, more than feared as a monarch. Among the Five Nations, or the Iroquois, the most celebrated common-wealth of North America, and in some other nations, there is no other qualification absolutely necessary for their head men, but age, with experience, and ability in their affairs. Every thing is transacted among them with much ceremony, which, contributes to fix all transactions the better in their memory. In order to help this, they have belts of small shells, or beads of different colours, which have all a different meaning, according to their colour or arrangement. At the end of every matter which they discourse upon, when they treat with a foreign state, they deliver one of these belts. If they should omit this ceremony, what they say passes for nothing. These belts are carefully treasured up in each town, and serve as the public records of the nation; and to these they occasionally have recourse, when any contests happen between them and their neighbours. The same council of their elders which regulates whatever regards the external policy of the state, has the charge likewise of its internal peace and order. The loss of any one of their people, whether by natural death or by war, is lamented by the whole town he belongs to. The whole village attends the body to the grave, which is interred, being dressed in the most sumptuous ornaments. With the body of the deceased, are placed his bow and arrows, with what he valued most in his life, and provisions for the long journey which he is to take; for they universally hold the immortality of the soul, though their idea of it is gross. Though the women in America have generally the laborious part of the economy upon themselves, yet they are far from being the slaves which they appear to be; and are not all subject to the great subordination in which they are placed in countries where they seem to be more respected. No nations of the Indians are without a regular marriage, in which there are many ceremonies: the principal of which is the bride's presenting the bridegroom with a plate of their corn. Though incontinent before wedlock, the chastity of their women after marriage is remarkable. When the ancients among the Indians have resolved upon a war, they do not always declare what nation they are determined to attack, that the enemy upon whom they really intend to fall, may be off his guard. Nay they even sometimes let years pass over, without committing any act of hostility, that the vigilance of all may be unbent, by the long continuance of the watch, and the uncertainty of the danger. In the mean time, they are not idle at home: the principal captain summons the youths of the town to which he belongs: the war-kettle is set on the fire, the war-songs and dances begin: the hatchet is sent to all the villages of the same nation, and to all its allies: the fire-catches, and the war-songs are heard in all parts. The qualities in an Indian war are vigilance and attention, to give and to avoid surprise; also patience, and strength, to endure the intolerable fatigues and hardships which always attend it. The fate of their prisoners is the most severe of all: during the greatest part of their journey homewards, they suffer no injury; but when they arrive at the territories of the conquering state, or at those of their allies, the people from every village meet them, and think that they show their attachment to their friends, by their barbarous treatment of the unhappy prisoners. It is usual to offer a slave to each house that has lost a friend, giving the preference according to the greatness of the loss. The person who has taken the captive attends him to the door of the cottage to which he is delivered; and with him he gives a belt of wampum, to show that he has fulfilled the purpose of the expedition, in supplying the loss of a citizen; when he is either preserved and entertained as a friend, or put to death with the most horrid torments. Don Ulloa, in his celebrated voyage to South America, draws a very different, and at the same time a very melancholy picture of the Indians, in the province of Quito, where the cruel usage of their Spanish masters has quite destroyed their former spirit and love of liberty, and rendered them stupid, lazy, and contemptible. Nothing can move them, or alter their minds; even interest here loses all its power: it being common for them to decline doing

some little act of service, though offered a very considerable reward. Fear cannot stimulate, respect induce, or punishment compel them; being proof against every attempt to rouse them from their natural indolence, in which they seem to look down with contempt on the wisest of mortals. A great part of the barbarism and rusticity of the minds of the Indians, must, indeed, be imputed to the want of culture; for they who in some parts have enjoyed that advantage, are found to be no less rational than other men: and if they do not attain to all the politeness or civilized nations, they at least think properly. The Indians of the mission of Paraguay, are, among others, remarkable instances of this; who from an ambulatory and savage manner of living, have been reduced to order, reason, and religion. The disease which makes the greatest havoc among them is the small-pox, which is so fatal, that few escape it; accordingly it is looked upon in this country as a pestilence. This distemper is not continual, as in other nations; seven, eight, or more years passing without its being heard of: but when it prevails, towns and villages are soon thinned of their inhabitants.

I'NDICANT. *a.* (*indicans*, Lat.) Showing; pointing out; that directs what is to be done in any disease,

To I'NDICATE. *v. a.* (*indico*, Latin.) 1. To show; to point out. 2. (In physic.) To point out a remedy.

INDICA'TION. *s.* (*indicatio*, Latin.) 1. Mark; token; sign; note; symptom (*Atterbury*). 2. Discovery made; intelligence given (*Bentley*). 3. Explanation; display (*Bacon*).

INDICATION, in medicine, is that which demonstrates in a disease what ought to be done. It is three-fold: preservative, which preserves health: curative, which expels a present disease; and vital, which respects the powers and reasons of diet. The scope from which indications are taken or determined is comprehended in this distich:

——Ars, ætas, regio, complexio, virtus,
Mos et symptoma, repletio, tempus et usus.

INDI'CATIVE. *a.* (*indicativus*, Latin.) Shewing; informing, pointing out.

INDI'CATIVE, in grammar, the first mood, or manner of conjugating a verb, by which we simply affirm, deny, or ask something; as, amant, they love; non amant, they do not love; amas tu, dost thou love?

INDI'CATIVELY. *ad.* In such a manner as shews or betokens.

INDICATOR, (*Indicator, oris*, m, from indico, to point; so named from its office of extending the index or fore-finger). Extensor indicis, Extensor secundi internodii indicis, proprius vulgo indicator of Douglas. An extensor muscle of the fore-finger, situated chiefly on the lower and posterior part of the fore-arm. It arises by an acute fleshy beginning from the middle of the posterior part of the ulna, its tendon passes under the same ligament with the extensor digitorum communis, with part of which it is inserted into the posterior part of the fore-finger.

To INDI'CT. See ENDITE, and its derivatives.

INDI'CTION. *s.* (*indiction*, Fr. *indico*, Lat.) 1. Declaration; proclamation (*Bacon*). 2. (In chronology.) The indiction, instituted by Constantine the Great, is a cycle of tributes, for fifteen years, and by it accounts were kept. Afterward, in memory of the victory obtained by Constantine over Mezentius, 8 Cal. Oct. 312, by which freedom was given to christianity, the council of Nice, for the honour of Constantine, ordained that the accounts of years should be no longer kept by the Olympiads, but by the indiction, which hath its epocha A. D. 313. Jan. 1.

INDI'CTMENT, is a written accusation of one or more persons of a crime or misdemeanor, preferred to, and presented on oath by a grand jury. 4 Black. 302.

An indictment may be found on the oath of one witness only, unless it is for high treason, which requires two witnesses; and unless in any instance it is otherwise specially directed by acts of parliament. 2 Haw.

The sheriff of every county is bound to return to every session of the peace, and every commission of oyer and terminer, and of general gaol-delivery, 24 good and lawful men of the county, some out of every hundred, to inquire, present, do, and execute, all those things which on the part of our lord the king shall then and there be commanded therein. As many as appear upon this pannel are sworn of the grand jury, to the amount of twelve at the least, and not more than twenty-three, that twelve may be a majority. This grand jury is previously instructed in the articles of their inquiry, by a charge from the judge on the bench. They then withdraw from court to sit and receive indictments, which are preferred to them in the name of the king, but at the suit of any private prosecutor; and they are only to hear evidence on behalf of the prosecution: for the finding an indictment is only in the nature of an inquiry or accusation, which is afterwards to be tried and determined; and the grand jury are only to inquire upon their oaths whether there is sufficient cause to call upon the party to answer it.

It seems generally agreed, that the grand jury may not find part of an indictment true and part false; but must either find a true bill or ignoramus for the whole: and if they take upon them to find it specially or conditionally, or to be true for part only and not for the rest, the whole is void, and the party cannot be tried upon it, but ought to be indicted anew. 2 Haw. 210.

All capital crimes whatever, and all kinds

of inferior crimes which are of a public nature, as misprisons, contempts, disturbances of the peace, oppressions, and all other misdemeanors whatever of a public evil example against the common law, may be indicted, but no injuries of a private nature, unless they in some degree concern the king. And generally where a statute prohibits a matter of public grievance to the liberties and security of a subject, or commands a matter of public convenience, as the repairing of the common streets of the town, &c. every disobedience of such statute is punishable, not only at the suit of the party grieved, but also by way of indictment, for contempt of the statute, unless such method of proceeding shall manifestly appear to be excluded by it. Yet if the party offending has been fined in an action brought by the party (as it is said he may in every action for doing a thing prohibited by statute), such fine is a good bar to the indictment, because by the fine the end of the statute is satisfied; otherwise he would be liable to a second fine for the same offence. 2 Inst. 55.

If several offenders commit the same offence, though in law they are several offences in relation to the several offenders, yet they may be joined in one indictment; as if several commit a robbery, or burglary, or murder. 2 H. H. 173.

No indictment for high treason, or misprison thereof (except indictments for counterfeiting the king's coin, seal, sign, or signet), nor any process or return thereupon, shall be quashed for mis-reciting, misspelling, false or improper Latin, unless exception concerning the same is taken and made in the respective court where the trial shall be, by the prisoner or his counsel assigned, before any evidence given in open court on such indictment; nor shall any such mis-reciting, mis-spelling, false or improper Latin, after conviction on such indictment, be any cause or stay, or arrest of judgment; but nevertheless, any judgment on such indictment shall be liable to be reversed on writ of error as formerly.

An indictment accusing a man in general terms, without ascertaining the particular fact laid to his charge, is insufficient; for no one can know what defence to make to a charge which is uncertain, nor can plead it in bar or abatement of a subsequent prosecution; neither can it appear that the facts given in evidence against a defendant on such a general accusation, are the same of which the indictors have accused him; nor can it judicially appear to the court what punishment is proper for an offence so loosely expressed. 2 Haw. 266.

It is therefore best to lay all the facts in the indictment as near to the truth as possible: and not to say, in an indictment for a small assault (for instance) wherein the person assaulted received little or no bodily hurt, that such a one, with swords, staves, and pistols, beat, bruised, and wounded him, so that his life was greatly despaired of; not to say in an indictment for a highway being obstructed, that the king's subjects cannot go thereon without manifest danger of their lives, and the like: which kind of words not being necessary, may stagger an honest man upon his oath to find the fact as so laid.

No indictment can be good without expressly shewing some place wherein the offence was committed, which must appear to have been within jurisdiction of the court. 2 Haw. 236.

There are several emphatical words which the law has appropriated for the description of an offence, which no circumlocution will supply; as feloniously, in the indictment of any felony; burglariously, in an indictment of burglary, and the like. 2 H. H. 184.

An indictment on the black act for shooting at any person must charge that the offence was done wilfully and maliciously.

By 10 and W. c. 23, it is enacted, that no clerk of the assize, clerk of the peace, or other officer, shall take any money of any person bound over to give evidence against a traitor or felon for the discharge of his recognizance, nor take more than 2s. for drawing any bill of indictment against any such felon, on pain of 5l. to the party grieved, with full costs. And if he shall draw a defective bill, he shall draw a new one gratis on the like penalty.

With respect to drawing indictments for other misdemeanors, not being treason or felony, no fee is limited by the statute; the same, therefore, depends on the custom and ancient usage.

Every person charged with any felony or other crime, who shall on his trial be acquitted, or against whom no indictment shall be found by the grand jury, or who shall be discharged by proclamation for want of prosecution, shall be immediately set at large in open court, without payment of any fee to the sheriff or gaoler; but in lieu thereof, the treasurer, on a certificate signed by one of the judges or justices before whom such prisoner shall have been discharged, shall pay out of the general rate of the county or district, such sum as has been usually paid, not exceeding 13s. 4d.

But an action cannot be brought by the person acquitted against the prosecutor of the indictment, without obtaining a copy of the record of his indictment and acquittal; which in prosecutions for felony it is not usual to grant, if there is the least probable cause to found such prosecution upon. For it would be a very great discouragement to the public justice of the kingdom, if prosecutors who had a tolerable ground of suspicion were liable to be sued at law whenever their indictsments miscarried. But an action on the case for a malicious prosecution may be founded on such an indictment whereon on acquittal can be, as if it

is rejected by the grand jury, or is coram non judice, or is insufficiently drawn; for it is not the danger of the plaintiff, but the scandal, vexation, and expense, upon which this action is founded. However, any probable cause for preferring it is sufficient to justify the defendant, provided it does not appear that the prosecution was malicious. 3 Black. 126.

INDICUM, in antiquity, a word denoting a blue colour or pigment used in Rome, probably the same as our Indigo.

INDICUS COLAR, a term used by several ancient writers to express black.

INDIES (East). These are divided into India within the river Ganges, and India beyond the river Ganges. The various provinces and kingdoms of both the divisions of India are described under their respective names.

INDIES (West). Islands of the Atlantic, which extend from the coast of Florida, in a curve, to the coast of Surinam, in South America, from 58. 20. to 85. 30. west longitude from Greenwich, and from 10. to 27. 50. north latitude: making Cuba the westerly boundary, the Bahamas the most northerly; and fixing the easterly point at the island of Barbadoes, and the southerly at Trinidad. The name was given by Columbus; and is not unfrequently applied to the whole of America. Most of these islands are treated of separately. See CUBA, &c.

INDI'FFERENCE. } INDI'FFERENCY. } *s.* (*indifference*, F. *indifferentia*, Lat.) 1. Neutrality; suspension; equipoise or freedom from motives on either side (*Locke*). 2. Impartiality (*Whitgift*). 3. Negligence; want of affection; unconcernedness (*Addison*). 4. State in which no moral or physical reason preponderates (*Hooker*).

INDI'FFERENT. *a.* (*indifferent*, Fr. *indifferens*, Latin.) 1. Neutral; not determined on either side (*Addison*). 2. Unconcerned; inattentive; regardless (*Rogers*). 3. Not having such difference as that the one is for its own sake preferable to the other (*Locke*). 4. Impartial; disinterested (*Davies*). 5. Passable; having mediocrity; of a middling state (*Roscommon*). 6. In the same sense it has the force of an adverb; as, indifferent *well* (*Shakspeare*).

INDI'FFERENTLY. *ad.* (*indifferenter*. Lat.) 1. Without distinction; without preference (*Newton*). 2. Equally; impartially (*Com. Prayer*). 3. In a neutral state; without wish or aversion (*Shaks.*). 4. Not well; tolerably; passibly; middlingly (*Carew*).

I'NDIGENCE. } I'NDIGENCY. } *s.* (*indigence*, Fr. *indigentia*, Lat.) Want; penury; poverty (*Burnet*).

INDI'GENOUS. *a.* (*indigéne*, Fr. *indigena*, Lat.) Native to a country; originally produced or born in a region (*Arbuthnot*).

I'NDIGENT. *a.* (*indigens*, Lat.) 1. Poor: needy; necessitous (*Addison*). 2. In want; wanting (*Philips*). 3. Void; empty (*Bacon*).

INDIGE'ST. } INDIGE'STED. } *a.* (*indigeste*, Fr. *indigestus*, Latin.) 1. Not separated into distinct parts; not regularly disposed (*Raleigh*). 2. Not formed, or shaped (*Shakspeare*). 3. Not well considered and methodised (*Hook*). 4. Not concocted in the stomach (*Dryden*). 5. Not brought to suppuration (*Wiseman*).

INDIGE'STIBLE. *a.* (from *in* and *digestible.*) Not conquerable in the stomach (*Arbuthnot*).

INDIGE'STION. *s.* (*indigestion*, French.) 1. A morbid weakness of the stomach; want of concoctive power. See DIGESTION. 2. The state of meats unconcocted (*Temple*).

To INDI'GITATE. *v.a.* (*indigito*, Lat.) To point out; to show by the fingers (*Brown*).

INDIGITA'TION. *s.* (from *indigitate.*) The act of pointing out or showing (*More*).

INDI'GN. *a.* (*indigne*, Fr.) Not in use. 1. Unworthy; undeserving (*Bacon*). 2. Bringing indignity; disgraceful (*Shaks.*)

INDI'GNANT. *a.* (*indignans*, Lat.) Angry; raging; inflamed at once with anger and disdain (*Arbuthnot*).

INDIGNA'TION. *s.* (*indignation*, French; *indignatio*, Latin.) 1. Anger mingled with contempt or disgust (*Clarendon*). 2. The anger of a superiour (*Kings*). 3. The effect of anger (*Shakspeare*).

INDI'GNITY. *s.* (*indignitas*, Lat.) Contumely; contemptuous injury; violation of right accompanied with insult (*Hooker*).

INDIGO, in botany. See INDIGOFERA.

INDIGO, Bastard. See AMORPHA.

INDIGOFERA. In botany, a genus of the class diadelphia, order decandria. Calyx spreading; reel of the corol with a subulate, spreading spur on each side; legume linear. Fifty-one species, chiefly natives of the Cape and India: they may be thus subdivided:

A. Leaves simple.
B. Leaves ternate.
C. Leaves quinate.
D. Leaves pinnate. This last sub-division comprising by far the greatest number. The stems of most of the species are shrubby; and the flowers red or purple.

The most important of the whole number by far, is I. tinctoria. Common indigo plant—a native of the East Indies, with pinnate leaves in four pairs, oblong, glabrous; racemes shorter than the leaf; legumes cylindrical, slightly curved; stem shrubby. The plant requires a rich, and rather a moist soil, well and deeply dug. The seeds that resemble grains of gunpowder are sown in little furrows, about the breadth of the hoe, at the depth of two or three inches, in a straight line, and a foot asunder. The seeds may be sown in any season, but the spring is generally preferred. When sown the ground should be well watered, and the weeds carefully plucked up as they make their appearance. The seeds shoot above the surface in three or four days; and the

whole plant is ripe in about two months. When it begins to flower, it is cut with pruning knives, an operation which is repeated about six weeks afterwards in wet weather. It is seldom suffered to continue more than two years, being then supposed to degenerate; when it is dug up, and a new crop sown in its stead.

From the leaves of the small branches is prepared that excellent dye which is known by the name of INDIGO. The leaves, when cut down, are thrown into large vats of water, where they are suffered to remain till a considerable fermentation ensues, and the water progressively acquires a violet colour. This happens in about sixteen or eighteen hours from the commencement of the infusion, at which time the water is conveyed by means of cocks at the bottom of the vat into another vessel, in which it is constantly agitated by a kind of churn till it becomes frothy all over the surface, and every part is intimately blended with every part. It is then allowed to settle, and the superincumbent water being drawn off, the indigo remains at the bottom of the vessel like a sediment or feculence.

The negroes on the coast of Guinea gather the leaves of the plant at any season of the year, pound them into a paste which they dry and preserve in the form of loaves. When they want to use them for the purpose of dying, they dissolve them in a ley, for which they usually prefer the ashes of the sea purslane, the fortulaca minima latifolia of Plumier, by the negroes called rheme. This ley imbibes a tincture of the indigo, into which they dip their linen cold, and repeat the immersion according to the depth of colour they intend to give it. Indigo, or a substance very similar to it, both in external colour and chemical test, may be obtained from various other plants, and especially from different species of amorpha, sophora, and isatis, but not in equal quantity nor equal excellence with the indigo of the indigofera or real indigo plant.

INDIGO is a soft powder, of a deep blue, without either taste or smell. It undergoes no change, though kept exposed to the air. Water, unless kept long upon it, does not dissolve any part of it, nor produce any change. When heat is applied to indigo, it emits a bluish red smoke, and at last burns away with a very faint white flame, leaving behind it the earthy parts in the state of ashes. Neither oxygen nor the simple combustibles have any effect upon indigo, except it is in a state of solution; and the same remark applies to the metallic bodies. The fixed alkaline solutions have no action on indigo, except it is newly precipitated from a state of solution. In that case they dissolve it with facility. The solution has at first a green colour, which gradually disappears, and the natural colour of the indigo cannot be again restored. Hence we see that the alkalies, when concentrated, decompose indigo. Pure liquid ammonia acts in the same way. Even carbonate of ammonia dissolves precipitated indigo, and destroys its colour; but the fixed alkaline carbonates have no such effect. Lime-water has scarcely any effect upon indigo in its usual state; but it readily dissolves precipitated indigo. The solution is at first green, but becomes gradually yellow. When the solution is exposed to the air, a slight green colour returns, as happens to the solution of indigo in ammonia; but it soon disappears.

The action of the acids upon indigo has been examined with most attention, it certainly exhibits the most important phenomena. When diluted, sulphuric acid is digested over indigo, it produces no effect, except that of dissolving the impurities; but concentrated sulphuric acid dissolves it readily. One part of indigo, when mixed with eight parts of sulphuric acid, evolves heat, and is dissolved in about twenty-four hours. According to Haussman, some sulphurous acid and hydrogen gas are evolved during the solution. If so, we are to ascribe them to the mucilage and resin which are doubtless destroyed by the action of the concentrated acid.

The solution of indigo is well known in this country by the name of liquid blue, or sulphat of indigo. While concentrated it is opaque and black; but when diluted, it assumes a fine deep blue colour; and its intensity is such, that a single drop of the concentrated sulphate is sufficient to give a blue colour to many pounds of water. Bergman ascertained the effect of different re-agents on this solution with great precision. Dropped into sulphurous acid, the colour was at first blue, then green, and very speedily destroyed. In vinegar it becomes green, and in a few weeks the colour disappears. In weak potash it becomes green, and then colourless. In weak carbonate of potash there are the same changes, but more slowly. In ammonia and its carbonate, the colour becomes green, and then disappears. In a solution of sugar, it became green, and at last yellowish. In sulphate of iron, the colour became green, and in three weeks disappeared. In the sulphurets the colour was destroyed in a few hours. Realgar, white oxide of arsenic, and orpiment, produced no change. Black oxide of manganese destroyed the colour completely. From these and many other experiments it was inferred, that all those substances which have a very strong affinity for oxygen, give a green colour to indigo, and at last destroy it. Hence it is imagined, that indigo becomes green by giving out oxygen. Of course it owes its blue colour to that principle.

M. Haussman, in a letter addressed to M. Berthollet, gives an account of the manner in which the solution of indigo is prepared, by means of an alkaline solution of red arsenic, for the use of calico printers.

He merely makes a caustic alkaline solu-

tion of red arsenic, to which he adds, while it is still boiling, a sufficient quantity of indigo bruised, in order to obtain a very deep shade; which it is still easy to render more or less intense, as the object may require, by diluting the solution of indigo with a weak ley of caustic potash, which is preferable to pure water, because it retards a little the absorption of the oxygen of the atmosphere, and consequently retards the regeneration of the indigo. The beauty of the blue in the stuffs requires that this regeneration should not be too sudden or too tardy. The too slow absorption, proceeding from a too great excess of caustic alkali, should be avoided in the blue for pencilling with, as well as in the stone blues, which advantage we procure by passing the stuffs printed with bruised indigo, mixed with a gummy solution of sulphate of iron, alternately through vats of caustic potash, sulphate of iron oxidated at the minimum, and finally through a vat acidulated by the sulphuric or muriatic acids.

On exposing to the sand bath a mixture of bruised indigo and muriatic solution of tin with excess of acid, and oxidated at the minimum, the colouring substance is decomposed, liberating a gas of an insupportable and pernicious smell, which ought to be examined.

If indigo, treated with the muriatic solution of tin oxidated at the minimum, without the assistance of a caustic alkali, is of no use in dying, this is not the case with sulphat of indigo treated or mixed in different proportions with the same solution of tin, after having previously absorbed the sulphuric acid; the latter being made use of in printing-houses for producing all sorts of blue and green shades (*Annales des Arts et Manuf*).

INDIRE'CT. *a.* (*indirectus*, Latin.) 1. Not straight; not rectilinear. 2. Not tending otherwise than obliquely or consequentially to a purpose. 3. Wrong; improper (*Shakspeare*). 4. Not fair; not honest (*Daniel*).

INDIRE'CTION. *s.* (*in* and *direction.*) 1. Oblique means; tendency not in a straight line (*Shakspeare*). 2. Dishonest practice: not used (*Shakspeare*).

INDIRE'CTLY. *ad.* (from *indirect.*) 1. Not in a right line; obliquely. 2. Not in express terms (*Broome*). 3. Unfairly; not rightly (*Taylor*).

INDIRE'CTNESS. *s.* (*in* and *directness.*) 1. Obliquity. 2. Unfairness; dishonesty.

INDISCE'RNIBLE. *a.* (*in* and *discernible.*) Not perceptible; not discoverable (*Denham*).

INDISCE'RNIBLY. *ad.* (from *indiscernible.*) In a manner not to be perceived.

INDISCE'RPTIBLE. *a.* (*in* and *discerptible.*) Not to be separated; incapable of being broken or destroyed by dissolution of parts.

INDISCERPTIBI'LITY. *s.* (from *indiscerptible.*) Incapability of dissolution.

INDISCO'VERY. *s.* (*in* and *discovery.*) The state of being hidden (*Brown*).

INDISCREE'T. *a.* (*indiscret*, French.) Imprudent; incautious; inconsiderate; injudicious (*Spenser*).

INDISCREE'TLY. *ad.* Without prudence; without consideration (*Sandys*).

INDISCRE'TION. *s.* (*indiscretion*, French.) Imprudence; rashness; inconsideration (*Hayw.*)

INDISCRI'MINATE. *a.* (*indiscriminatus*, Latin.) Undistinguishable; not marked with any note of distinction.

INDISCRI'MINATELY. *ad.* Without distinction (*Government of the Tongue*).

INDISPE'NSABLE. *a.* (French.) Not to be remitted; not to be spared; necessary (*Woodward*).

INDISPE'NSABLENESS. *s.* State of not being to be spared; necessity.

INDISPE'NSABLY. *ad.* (from *indispensable.*) Without dispensation; without remission; necessarily (*Addison*).

To INDISPO'SE. *v. a.* (*indisposer*, French.) 1. To make unfit (*Atterbury*). 2. To disincline; to make averse (*Smith*). 3. To disorder; to disqualify for its proper functions (*Glanville*). 4. To disorder slightly with regard to health (*Walton*). 5. To make unfavourable (*Clarendon*).

INDISPO'SEDNESS. *s.* (from *indisposed.*) State of unfitness or disinclination; disordered state (*Decay of Piety*).

INDISPOSI'TION. *s.* (*indisposition*, Fr.) 1. Disorder of health; tendency to sickness; slight disease (*Hayward*). 2. Disinclination; dislike (*Hooker*).

INDISPU'TABLE. *a.* (*in* and *disputable.*) Uncontrovertible; incontestable (*Rogers*).

INDISPU'TABLENESS. *s.* The state of being indisputable; certainty; evidence.

INDISPU'TABLY. *ad.* (from *indisputable.*) 1. Without controversy; certainly (*Brown*). 2. Without opposition (*Howel*).

INDISSO'LVABLE. *a.* (*in* and *dissolvable.*) 1. Indissoluble; not separable as to its parts (*Newton*). 2. Obligatory; not to be broken; binding for ever (*Ayliffe*).

INDISSOLUBI'LITY. *s.* (*indissolubilité*, French.) 1. Resistance to a dissolving power; firmness; stableness (*Locke*). 2. Perpetuity of obligation.

IN'DISSOLUBLE. *a.* (*indissoluble*, French.) 1. Resisting all separation of its parts; firm; stable (*Boyle*). 2. Binding for ever; subsisting for ever (*Bacon*).

INDI'SSOLUBLENESS. *s.* Indissolubility; resistance to separation of parts (*Hale*).

INDI'SSOLUBLY. *ad.* (from *indissoluble.*) 1. In a manner resisting all separation (*Boyle*). 2. For ever obligatory.

INDISTI'NCT. *a.* (*indistinct*, French.) 1. Not plainly marked; confused (*Dryden*). 2. Not exactly discerning (*Shakspeare*).

INDISTI'NCTION. *s.* (from *indistinct.*) 1. Confusion; uncertainty (*Brown*). 2. Omission of discrimination (*Sprat*).

INDISTI'NCTLY. *ad.* (from *indistinct.*) 1. Confusedly; uncertainly (*Newton*). 2. Without being distinguished (*Brown*).

INDISTI'NCTNESS. *s.* (from *indistinct.*) Confusion; uncertainty; obscurity (*Newton*).

INDISTU'RBANCE. *s.* (*in* and *disturb.*) Calmness; freedom from disturbance. (*Tem.*)

INDIVI'DUAL. *a.* (*individu*, *individuel*, French.) 1. Separate from others of the same species; single; numerically one (*Watts*). 2. Undivided; not to be parted or disjoined (*Milton*).

INDIVIDUA'LITY. *s.* (from *individual.*) Separate or distinct existence (*Arbuthnot*).

INDIVI'DUALLY. *ad.* (from *individual.*) 1. With separate or distinct existence; numerically (*Hooker*). 2. Not separably; incommunicably (*Hakew.*)

To INDIVI'DUATE. *v. a.* (from *individuus*, Latin.) To distinguish from others of the same species; to make single (*More*).

INDIVIDUA'TION. *s.* (from *individuate.*) That which make an individual (*Watts*).

INDIVIDU'ITY. *s.* (from *individuus*, Lat.) The state of being an individual; separate existence.

INDIVI'NITY. *s.* (*in* and *divinity.*) Want of divine power: not in use (*Brown*).

INDIVISIBI'LITY. } INDIVI'SIBLENESS. } *s.* (from *indivisible.*) State in which no more division can be made (*Locke*).

INDIVI'SIBLE. *a.* (*indivisible*, French.) What cannot be broken into parts; so small as that it cannot be smaller (*Digby*).

INDIVI'SIBLES, in geometry, those indefinitely small principles or elements, into which any body or figure may be supposed to be ultimately resolved.

The method of comparing magnitudes invented by Cavalerius, called *indivisibles*, supposes lines to be compounded of points, surfaces of lines, and solids of planes; or, to make use of his own description, surfaces are considered as cloth consisting of parallel threads, and solids are formed of parallel planes, as a book is composed of its leaves, with this restriction, that the threads, or lines of which surfaces are compounded, are not to be of any conceivable breadth, nor the leaves or planes of solids, of any thickness. He then forms these propositions, that surfaces are to each other, as all the lines in one, to all the lines in the other; and solids, in like manner, in the proportion of their planes.

For instance, every sphere is two-thirds of a circumscribing cylinder. Let the hemisphere BCM, the circumscribing cylinder BDKM (pl. 88. figs. 8, 9.), and the inscribed cone DAK of the same base and altitude, be supposed to consist of planes as HEGH parallel to the base. Since $HF^2 = AE^2 = EF^2 + FA^2 = EF^2 + GF^2$; and since the circles of which HF, FF, and GF are the radii, are as the squares of those radii; the area of the circle in the cylinder whose radius is HF, is equal to the sum of the areas of the circles in the hemisphere and inscribed cone, whose radii are EF and GF. Therefore the sum of all the circular planes, which are supposed to compose the cylinder, is equal to the sum of all the circular planes which compose the hemisphere, together with the sum of those which compose the inscribed cone. But the inscribed cone is one-third part of the cylinder; therefore the inscribed hemisphere is two-thirds of the same.

But this method of indivisibles, however true the conclusion is in this case, is manifestly founded on inconsistent and impossible suppositions. For while the lines, of which surfaces are supposed to be made up, are of *no* breadth, it is obvious that no number of them can form the least imaginable surface; if they are supposed to be of some sensible breadth, they are in reality parallelograms, how minute soever their altitude, and then the assumed proportion of Cavalerius may fail, for surfaces are not always in the same proportion with the parallelograms inscribing them. And the same contradictory suppositions obviously attend this composition of solids, or of lines. This kind of reasoning has, therefore, led to error; as in the case of pendulums vibrating in very small circular arcs, concerning which Keill and others maintain that the times of vibration in such arcs are equal to those of descent down the chords: whereas, in fact, the descents down the arcs are less than those along the chords, in the ratio of a quadrantal are of a circle to its diameter.

INDIVISIBLY. *ad.* (from *indivisible.*) So as it cannot be divided.

INDO'CIBLE. *a.* (*in* and *docible.*) Unteachable; insusceptible of instruction.

INDO'CIL. *a.* (*indocile*, French.) Unteachable; incapable of being instructed (*Bentley*).

INDOCI'LITY. *s.* (*indocilité*, French.) Unteachableness; refusal of instruction.

To INDO'CTRINATE. *v. a.* (*endoctriner*, old French.) To instruct; to tincture with any science, or opinion (*Clarendon*).

INDOCTRINA'TION. *s.* (from *indoctrinate.*) Instruction; information (*Brown*).

I'NDOLENCE. } I'NDOLENCY. } *s.* (*in* and *doleo*, Latin; *indolence*, French.) 1. Freedom from pain (*Burnet*). 2. Laziness; inattention; listlessness (*Dryden*).

I'NDOLENT. *a.* (French.) 1. Free from pain. 2. Careless; lazy; inattentive; listless (*Pope*).

I'NDOLENTLY. *ad.* (from *indolent.*) 1. With freedom from pain. 3. Carelessly; lazily; inattentively; listlessly (*Addison*).

INDORSE'MENT, in law, any thing written on the back of a deed; as a receipt for money received. There is likewise an indorsement, by way of assignment, on bills of exchange and notes of hand; which is done by writing a person's name on the back thereof.

To INDO'W. *v. a.* (*indotare*, Latin.) To portion; to enrich with gifts.

INDRA'UGHT. *s.* (*in* and *draught.*) 1. An opening in the land into which the sea

flows (*Raleigh*). 2. Inlet; passage inward (*Bacon*).

I'NDRE, a department of France, which includes the late province of Berry. It has its name from a river, which rises in this department, and passing into that of Indre and Loire, falls into the Loire between Chinon and Saumur.

Indre and Loire, a department of France, which includes the late province of Touraine.

To INDRE'NCH. *v. a.* (from *drench.*) To soak; to drown (*Shakspeare*).

INDU'BIOUS. *a.* (*in* and *dubious.*) Not doubtful; not suspecting; certain (*Harvey*).

INDU'BITABLE. *a.* (*indubitabilis*, Latin.) Undoubted; unquestionable (*Watts*).

INDU'BITABLY. *ad.* (from *indubitable.*) Undoubtedly; unquestionably (*Sprat*).

INDU'BITATE. *a.* (*indubitatus*, Latin.) Unquestioned; certain; evident (*Wotton*).

To INDU'CE. *v. a.* (*induire*, French, *induco*, Latin.) 1. To persuade; to influence to any thing (*Hayward*). 2. To produce by persuasion or influence (*Bacon*). 3. To offer by way of induction, or consequential reasoning (*Brown*). 4. To inculcate; to inforce (*Temple*). 5. To cause extrinsically; to produce (*Bacon*). 6. To introduce; to bring into view (*Pope*). 7. To bring on; to superinduce (*Decay of Piety*).

INDU'CEMENT. *s.* (from *induce.*) Motive to any thing; that which allures or persuades to any thing (*Rogers*).

INDU'CER. *s.* (from *induce.*) A persuader; one that influences.

To INDU'CT. *v. a.* (*inductus*, Latin.) 1. To introduce; to bring in (*Sandys*). 2. To put into actual possession of a benefice (*Ayliffe*).

INDU'CTION. *s.* (*induction*, Fr. *inductio*, Latin.) 1. Introduction; entrance (*Shaks*). 2. The act or state of taking possession of an ecclesiastical living.

Induction, in logic, is that process of the understanding by which, from a number of *particular* truths perceived by simple apprehension, and diligently compared together, we infer another truth which is always *general* and sometimes *universal*. In the process of induction, the truths to be compared must be of the same kind, or relate to objects having a similar nature: every one knows that physical truths cannot be compared with moral truths, nor the truths of pure mathematics with either.

The method of induction is admitted by British philosophers to be the only method of reasoning by which any progress can be made in the physical sciences; for the laws of nature can be discovered only by accurate experiments, and by carefully noting the agreements and the differences, however minute, which are thus found among the phenomena apparently similar. It is not, however, commonly said that induction is the method of reasoning employed by the mathematicians; and Dr. Robison long thought, with others, that in pure geometry the reasoning is strictly syllogistical. Mature reflection, however, led him to doubt, with Dr. Reid, the truth of the generally received opinion, to doubt even whether by categorical syllogisms any thing whatever can be proved.

To the idolaters of Aristotle we are perfectly aware that this will appear an extravagant paradox; but to the votaries of truth, we do not despair of making it very evident, that for such doubts there is some foundation.

The fundamental axiom upon which every categorical syllogism rests, is the well known proposition, which affirms, that "whatever may be predicated of a whole genus, may be predicated of every species and of every individual comprehended under that genus." This is indeed an undoubted truth; but it cannot constitute a foundation for reasoning from the genus to the species or the individual; because we cannot possibly know what can be predicated of the genus till we know what can be predicated of all the individuals ranged under it. Indeed it is only by ascertaining, through the medium of induction, what can be predicated, and what not, of a number of individuals, that we come to form such notions as those of genera and species; and therefore, in a syllogism strictly categorical, the propositions, which constitute the premises, and are taken for granted, are those alone which are capable of proof; whilst the conclusion, which the logician pretends to demonstrate, must be evident to intuition or experience, otherwise the premises could not be known to be true. The analysis of a few syllogisms will make this apparent to every reader.

Dr. Wallis, who, to an intimate acquaintance with the Aristotelian logic, added much mathematical and physical knowledge, gives the following syllogism as a perfect example of this mode of reasoning in the first figure, to which it is known that all the other figures may be reduced:—

> Omne animal *est* sensu præditum.
> Socrates *est* animal. *Ergo*
> Socrates *est* sensu præditus.

Here the proposition to be demonstrated is, that Socrates is endowed with sense; and the propositions assumed as self-evident truths, upon which the demonstration is to be built, are, that "every animal is endowed with sense;" and that "Socrates is an animal." But how comes the demonstrator to know that "every animal is endowed with sense?" To this question we are not aware of any answer which can be given, except this, that mankind have agreed to call every being, which they perceive to be endowed with sense, an animal. Let this, then, be supposed the true answer: the next question to be put to the demonstrator is, How he comes to know that Socrates is an animal? If we have answered the former question properly, or, in other words, if it be essential to this genus of beings to be endowed with sense, it is obvious that he can know that Socrates is an animal only by perceiving him to be endowed with sense; and therefore, in this syllogism, the proposition to be proved is the very first of the three of which the truth is perceived; and it is perceived intuitively, and not inferred from others by a process of reasoning.

Though there are ten categories and five predicables, there are but two kinds of categorical propositions, viz. Those in which the property or accident is predicated of the substance to which it belongs, and those in which the genus is predicated of the species or individual. Of the former kind is the proposition pretended to be proved by the syllogism which we have consi-

dered; of the latter, is that which is proved by the following:

> Quicquid sensu præditum, est animal.
> Socrates est sensu præditus. Ergo
> Socrates est animal.

That this is a categorical syllogism, legitimate in mode and figure, will be denied by no man who is not an absolute stranger to the very first principles of the Aristotelian logic; but it requires little attention indeed to perceive that it proves nothing. The imposition of names is a thing so perfectly arbitrary, that the being, or class of beings, which in Latin and English is called animal, is with equal propriety in Greek called ζωον, and in Hebrew נפש. To a native of Greece, therefore, and to an ancient Hebrew, the major proposition of this syllogism would have been wholly unintelligible; but had either of those persons been told by a man of known veracity, and acquainted with the Latin tongue, that every thing endowed with sense was by the Romans, called animal, he would then have understood the proposition, admitted its truth without hesitation, and have henceforth known that Socrates and Moses, and every thing else which he perceived to be endowed with sense, would at Rome be called animal. This knowledge, however, would not have rested upon demonstrative reasoning of any kind, but upon the credibility of his informer, and the intuitive evidence of his own senses.

It will perhaps be said, that the two syllogisms which we have examined are improper examples, because the truth to be proved by the former is self-evident, whilst that which is meant to be established by the latter is merely verbal, and therefore arbitrary. But the following is liable to neither of these objections:

> All animals *are* mortal.
> Man *is* an animal; *therefore*
> Man *is* mortal.

Here it would be proper to ask the demonstrator, upon what grounds he so confidently pronounces all animals to be mortal? The proposition is so far from expressing a self-evident truth, that, previous to the entrance of sin and death into the world, the first man had surely no conception of mortality. He acquired the notion, however, by experience, when he saw the animals die in succession around him; and when he observed that no animal with which he was acquainted, not even his own son, escaped death, he would conclude that all animals, without exception, are mortal. This conclusion, however, could not be built upon syllogistic reasoning, nor yet upon intuition, but partly upon experience and partly on analogy. As far as his experience went, the proof, by induction, of the mortality of all animals was complete; but there are many animals in the ocean, and perhaps on the earth, which he never saw, and of whose mortality therefore he could affirm nothing but from analogy, *i. e.* from concluding, as the constitution of the human mind compels us to conclude, that nature is uniform throughout the universe, and that similar causes, whether known or unknown, will in similar circumstances, produce at all times similar effects. It is to be observed of this syllogism, as of the first which we have considered, that the proposition, which it pretends to demonstrate, is one of those truths known by experience, from which, by the process of induction, we infer the major of the premises to be true; and that therefore the reasoning, if reasoning it can be called, runs in a circle.

Yet by a concatenation of syllogisms have logicians pretended that a long series of important truths may be discovered and demonstrated; and even Wallis himself seems to think, that this is the instrument by which the mathematicians have deduced, from a few postulates, accurate definitions, and undeniable axioms, all the truths of their demonstrative science. Let us try the truth of this opinion by analyzing some of Euclid's demonstrations.

All our first truths are particular; and it is by applying to them the rules of induction that we form general truths or axioms; even the axioms of pure geometry. As this science treats not of real external things, but merely of ideas or conceptions, the creatures of our minds, it is obvious, that its definitions may be perfectly accurate, the induction by which its axioms are formed complete, and therefore the axioms themselves universal propositions. The use of these axioms is merely to shorten the different processes of geometrical reasoning, and not, as has sometimes been absurdly supposed, to be made the parents or causes of particular truths. No truth, whether general or particular, can, in any sense of the word, be the cause of another truth. If it were not true that all individual figures, of whatever form, comprehending a portion of space equal to a portion comprehended by any other individual figure, whether of the same form with some of them, or of a form different from them all, are equal to one another, it would not be true that "things in general, which are equal to the same thing, or that magnitudes which coincide, or exactly fill the same space," are respectively equal to one another; and therefore the first and eighth of Euclid's axioms would be false. So far are these axioms, or general truths, from being the parents of particular truths, that, as conceived by us, they may, with greater propriety, be termed their offspring. They are indeed nothing more than general expressions, comprehending all particular truths of the same kind. When a mathematical proposition therefore is announced, if the terms of which it is composed, or the figures of which a certain relation is predicated, can be brought together and immediately compared, no demonstration is necessary to point out its truth or falsehood. It is indeed intuitively perceived to be either comprehended under, or contrary to some known axiom of the science; but it has the evidence of truth or falsehood in itself, and not in consequence of that axiom. When the figures or symbols cannot be immediately compared together, it is then, and only then, that recourse is had to demonstration; which proceeds, not in a series of syllogisms, but by a process of ideal mensuration or induction. A figure or symbol is conceived, which may be compared with each of the principal figures or symbols, or, if that cannot be, with one of them, and then another, which may be compared with it, till through a series of well known intermediate relations, a comparison is made between the terms of the original proposition, of which the truth or falsehood is then perceived.

Thus in the forty-seventh proposition of the first book of Euclid's Elements, the author proposes to demonstrate the equality between the

square of the hypothenuse of a right angled triangle, and the sum of the squares described on the other two sides; but he does not proceed in the way of categorical syllogisms, by raising his demonstration on some universal truth relating to the genus of squares. On the contrary, he proceeds to measure the three squares of which he has affirmed a certain relation; but as they cannot be immediately compared together, he directs the largest of them to be divided into two parallelograms, according to a rule which he had formerly ascertained to be just; and as these parallelograms can, as little as the square of which they are the constituent parts, be compared with the squares of the other two sides of the triangle, he thinks of some intermediate figure which may be applied as a common measure to the squares and the parallelograms. Accordingly, having before found that a parallelogram, or square, is exactly double of a triangle standing on the same base and between the same parallels with it, he constructs triangles upon the same base, and between the same parallels with his parallelograms, and the squares of the sides containing the right angle of the original triangle; and finding, by a process formerly shewn to be just, that the triangles on the bases of the parallelograms are precisely equal to the triangles on the bases of the squares, he perceives at once that the two parallelograms, of which the largest square is composed, must be equal to the sum of the two lesser squares; and the truth of the proposition is demonstrated.

In the course of this demonstration there is not so much as one truth inferred from another by syllogism, but all are perceived in succession by a series of simple apprehensions. Euclid, indeed, after finding the triangle constructed on the base of one of the parallelograms to be equal to the triangle constructed on the base of one of the squares, introduces an axiom, and says, "but the doubles of equals are equal to one another; therefore the parallelogram is equal to the square." But if from this mode of expression any man conceive the axiom or universal truth to be the cause of the truth more particular, or suppose that the latter could not be apprehended without a previous knowledge of the former, he is a stranger to the nature of evidence, and to the process of generalization, by which axioms are formed.

If we examine the problems of this ancient geometrician, we shall find that the truth of them is proved by the very same means which he makes use of to point out the truth of his theorems. Thus, the first problem of his immortal work is, "to describe an equilateral triangle on a given finite straight line;" and not only is this to be done, but the method by which it is done must be such as can be shown to be incontrovertibly just. The sides of a triangle, however, cannot be applied to each other so as to be immediately compared; for they are conceived to be immoveable among themselves. A common measure, therefore, or something equivalent to a common measure, must be found, by which the triangle may be constructed, and the equality of its three sides afterwards evinced; and this equivalent Euclid finds in the circle.

By contemplating the properties of the circle, it was easy to perceive that all its radii must be equal to one another. He therefore directs two circles to be described from the opposite extremities of the given finite straight line, so that it may be the radius of each of them; and from the point in which the circles intersect one another, he orders lines to be drawn to the extreme points of the given line, affirming that these three lines constitute an equilateral triangle. To convince his reader of the truth of this affirmation, he has only to put him in mind, that from the properties of the circle, the lines which he has drawn must be each equal to the given line, and of course all the three equal to one another; and this mutual equality is perceived by simple apprehension, and not inferred by syllogistic reasoning. Euclid, indeed, by introducing into the demonstration his first axiom, gives to it the form of a syllogism: but that syllogism proves nothing; for if the equality of the three sides of the triangle were not intuitively perceived in their position and the properties of the circle, the first axiom would itself be a falsehood. So true it is that categorical syllogisms have no place in geometrical reasoning; which is as strictly experimental and inductive as the reasoning employed in the various branches of physics.

But if this be so, how come the truths of pure geometry to be necessary, so that the contrary of any one of them is clearly perceived to be impossible; whilst physical truths are all contingent, so that there is not one of them of which the direct contrary may not easily be conceived?

That there is not one physical truth, of which the contrary may not be conceived, is not perhaps so certain as has generally been imagined; but admitting the fact to be as it has commonly been stated, the apparent difference between this class of truths and those of pure geometry, may be easily accounted for, without supposing that the former rests upon a kind of evidence totally different from that which supports the fabric of the latter.

The objects of pure geometry, as we have already observed, are the creatures of our own minds, which contain in them nothing concealed from our view. As the mathematician treats them merely as measurable quantities, he knows, with the utmost precision, upon what particular properties the relation affirmed to subsist between any two or more of them must absolutely depend; and he cannot possibly entertain a doubt but it will be found to have place among all quantities having the same properties, because it depends upon them, and upon them alone. His process of induction, therefore, by a series of ideal measurements, is always complete, and exhausts the subject; but in physical inquiries the case is widely different. The subjects which employ the physical inquirer are not his own ideas, and their various relations, but the properties, powers, and relations of the bodies which compose the universe; and of those bodies he knows neither the substance, internal structure, nor all the qualities: so that he can very seldom discover with certainty upon what particular property or properties the phenomena of the corporeal world, or the relations which subsist among different bodies, depend. He expects, indeed, with confidence, not inferior to that with which he admits a mathematical demonstration, that any corporeal pheaomenon, which he has observed in certain circumstances, will be always observed in circumstances exactly similar; but the misfortune is, that he can very seldom be ascertained of this similarity. He does not know any one piece of matter as it is in itself; he cannot separate its various properties; and of course

cannot attribute to any one property the effects, or apparent effects, which proceed exclusively from it. Indeed, the properties of bodies are so closely interwoven, that by human means they cannot be completely separated; and hence the most cautious investigator is apt to attribute to some one or two properties, an event which in reality results perhaps from many.—(see PHILOSOPHY and PHYSICS). This the geometrician never does. He knows perfectly that the relation of equality which subsists between the three angles of a plain triangle and two right angles, depends not upon the size of the triangles, the matter of which they are conceived to be made, the particular place which they occupy in the universe, or upon any one circumstance whatever besides their triangularity, and the angles of their corrolets being exactly right angles; and it is upon this power of discrimination which we have in the conceptions of pure geometry, and have not in the objects of physics, that the truths of the one science are perceived to be necessary, while those of the other appear to be contingent; though the mode of demonstration is the same in both, or at least, equally removed from categorical syllogisms. (*Sup. Ency. Bri.*)

INDU'CTIVE. *a.* (from *induct.*) 1. Leading; persuasive (*Milton*). 2. Capable to infer or produce (*Hale*).

To INDU'E. *v. a.* (*induo*, Latin.) To invest; to clothe (*Milton*).

To INDU'LGE. *v. a.* (*indulgeo*, Latin.) 1. To encourage by compliance (*Dryden*). 2. To fondle, to favour; to gratify with concession; to foster (*Atterbury*). 3. To grant not of right but of favour (*Pope*).

To INDULGE. *v. n.* To be favourable; to give indulgence (*Gov. of the Tongue*).

INDU'LGENCE. } *s.* (*indulgence*, French.)
INDU'LGENCY. } 1. Fondness; fond kindness (*Milton*). 2. Forbearance; tenderness: opposite to *rigour* (*Hammond*). 3. Favour granted; liberality (*Rogers*). 4. Grant of the church of Rome (*Atterbury*).

According to the doctrine of the Romish church, all the good works of the saints over and above those which were necessary towards their own justification, are deposited, together with the infinite merits of Jesus Christ, in one inexhaustible treasury. The keys of this were committed to St. Peter, and to his successors the popes, who may open it at pleasure, and, by transferring a portion of the superabundant merit to any particular person, for a sum of money, may convey to him either the pardon of his own sins, or a release for any one in whom he is interested, from the pains of purgatory. Such indulgences were first invented in the eleventh century, by Urban II. as a recompence for those who went in person upon the glorious enterprize of conquering the Holy Land. They were afterwards granted to those who hired a soldier for that purpose; and in process of time were bestowed on such as gave money for accomplishing any pious work enjoined by the pope.

The power of granting indulgences, as it was natural to expect, has been scandalously abused.

INDU'LGENT. *a.* (*indulgent*, French.) 1. Kind; gentle; liberal (*Rogers*). 2. Mild; favourable (*Waller*). 3. Gratifying; favouring; giving way to.

INDU'LGENTLY. *ad.* Without severity; without censure (*Hammond*).

INDU'LT, in the church of Rome, the power of presenting to beneficas granted to certain persons by the pope. Of this kind is the indult of kings and sovereign princes, in the Romish communion, and that of the parliament of Paris granted by several popes. By the concordat for the abolition of the pragmatic sanction, made between Francis I. and Leo X. in 1516, the French king had the power of nominating to bishoprics, and other consistorial benefices, within his realm. At the same time, by a particular bull, the pope granted him the privilege of nominating to the churches of Brittany and Provence.

To INDU'RATE. *v. n.* (*induro*, Latin.) To grow hard; to harden (*Bacon*).

To INDURATE. *v. a.* 1. To make hard (*Sharp*). 2. To harden the mind.

INDURA'TION. *s.* (from *indurate.*) 1. The state of growing hard (*Bacon*). 2. The act of hardening. 3. Obduracy; hardness of heart (*Duty of Piety*).

I'NDUS, a great river of Hindustan proper, called by the natives *Sinde*. It is formed of several streams which descend from the Persian and Tartarean mountains. Below the city of Moultan it proceeds in a S. W. direction, through the province of that name, and through Sindey, and enters the Arabian sea by several mouths N. W. of the gulf of Outch.

INDUS, in astronomy, *the Indian*, a new southern constellation, containing twelve stars of the first six magnitudes, viz. 0. 0. 0. 4. 6. 2.

INDUSTA'N. See HINDUSTAN.

INDU'STRIOUS. *a.* (*industrius*, Latin.) 1. Diligent; laborious; assiduous (*Milton*). 2. Designed; done for the purpose (*Watts*).

INDU'STRIOUSLY. *ad.* 1. Diligently; laboriously; assiduously (*Shakspeare*). 2. For the set purpose; with design (*Bacon*).

I'NDUSTRY. *s.* (*industria*, Latin.) Diligence; assiduity (*Shaks. Cowley*).

INE'BRIANTS, are defined to be such things as affect the nerves in a particular and agreeable manner, and through them alter and disturb the functions of the mind. They are properly divided into native and artificial; the former chiefly in use among the oriental and other nations, the latter principally throughout Europe.

To INE'BRIATE. *v. a.* (*inebrio*, Latin.) To intoxicate; to make drunk (*Sandys*).

To INEBRIATE. *v. n.* To grow drunk; to be intoxicated (*Bacon*).

INEBRIA'TION. *s.* (from *inebriate.*) Drunkenness; intoxication (*Brown*).

INEFFABI'LITY. *s.* (from *ineffable.*) Unspeakableness.

INE'FFABLE. *a.* (*ineffable*, French, *in-*

effabilis, Latin.) Unspeakable; unutterable (*South*).

INE'FFABLY. *ad.* (from *ineffable.*) In a manner not to be expressed (*Milton*).

INEFFE'CTIVE. *a.* (*ineffectif*, French; *in* and *effective.*) That can produce no effect; unactive; inefficient; useless (*Taylor*).

INEFFE'CTUAL. *a.* (*in* and *effectual.*) Unable to produce its proper effect; weak; wanting power (*Hooker*).

INEFFE'CTUALLY. *ad.* Without effect.

INEFFE'CTUALNESS. *s.* from *ineffectual.*) Inefficacy; want of power to perform the proper effect (*Wake*).

INEFFICA'CIOUS. a. (*inefficace*, French.) Unable to produce effects; weak; feeble (*Locke*).

INE'FFICACY. *s. in* and *efficacia*, Latin.) Want of power; want of effect.

INE'LEGANCE. } *s.* (from *inelegant.*)
INE'LEGANCY. } Absence of beauty; want of elegance.

INE'LEGANT. *a.* (*inelegans*, Latin.) 1. Not becoming; not beautiful (*Woodward*). 2. Mean; despicable; contemptible (*Broome*).

INE'LOQUENT. *a.* (*in* and *eloquens*, Lat.) Not persuasive; not oratorical.

INE'PT. *a.* (*ineptus*, Latin.) 1. Trifling; foolish (*More*). 2. Unfit for any purpose; useless (*Woodward*).

INE'PTLY. *ad.* (*ineptè*, Latin.) Triflingly; foolishly; unfitly (*More*).

INE'PTITUDE. *s.* (from *ineptus*, Latin.) Unfitness (*Wilkins*).

INEQUA'LITY. *s.* (from *inæqualitas*, Lat.) 1. Difference of comparative quantity (*Ray*). 2. Unevenness; interchange of higher and lower parts (*Newton*). 3. Disproportion to any office or purpose; state of not being adequate (*South*). 4. Change of state; unlikeness of a thing to itself (*Bacon*). 5. Difference of rank or station (*Hooker*).

INERRABI'LITY. *s.* (from *inerrable.*) Exemption from error; infallibility (*K.Ch.*)

INE'RRABLE. *a.* (*in* and *err.*) Exempt from error (*Hammond*).

INE'RRABLENESS. *s.* (from *inerrable.*) Exemption from error (*Hammond*).

INE'RRABLY. *ad.* (from *inerrable.*) With security from error; infallibly.

INE'RRINGLY. *ad.* (*in* and *erring.*) Without error; without deviation (*Glanville*).

INE'RT. *a.* (*iners*, Latin.) Dull; sluggish; motionless (*Blackmore*).

INERTIA OF MATTER, in philosophy, is defined by Sir Isaac Newton to be a passive principle by which bodies persist in their motion or rest, receive motion in proportion to the force impressing it, and resist as much as they are resisted. It is also defined by the same author to be a power implanted in all matter, whereby it resists any change endeavoured to be made in its state.

The celebrated Laplace considers inertia in the following manner: To conceive in what it consists, suppose a body in motion to meet with a body at rest: it will communicate to it a part of its motion; in such manner, that if the first have, for example a mass double to that of the second, in which case its mass will be two-thirds of the sum of the masses, the velocity which it will retain will be also two-thirds of that which it had at first; and as the other third which it has yielded to the second body employs itself upon a mass of only half the magnitude of the former, the two bodies will both have the same velocity after the shock.

The effect of inertia is reduced, therefore, to the communication made by one of these bodies to the other, of a part of its motion; and since this latter cannot receive, but in consequence of the other's losing, this loss has been attributed to a resistance exercised by the body receiving the motion. But in the instance before us, it is very nearly as in the motion of an elastic fluid, contained in a vessel from which we would open a communication to another vessel which should be empty; this fluid would introduce itself by its expansive force into the second vessel, until it became uniformly distributed in the capacities of the two vessels: in like manner a body when it strikes another does nothing else, as some would express themselves, than pour into this latter a part of its motion; and there is no more reason to suppose a resistance in this case than in the examples we have just cited. It is true that when we strike with the hand a body at rest, or whose motion is less rapid than that of the hand, we imagine that we experience a resistance; but the illusion proceeds from this, that the effect is the same with regard to the hand, as though it were at rest, and was struck by the body with a motion in a contrary direction.

The term *vis inertiæ* has been gradually falling into neglect, on the supposition that it implies a contradiction. This topic is discussed much at large by M. Carnot, in his Principes de l'Equilibre et du Mouvement: we have not room for the whole of his reasoning; but the following citations may enable the reader to comprehend it:

"We call *force of inertia* of each of two bodies at every instant, the resistance with which it opposes to its change of state, that is to say, the re-action which it exerts upon the system of other bodies which are made to pass from rest to motion, from motion to rest, or from one motion to another: that is, in a word, a force equal and contrary to that which must be impressed upon this moveable to make it pass from the state in which it was, to that in which it is found the succeeding instant. Whence it follows, that if the effective velocity of a moveable, before the stroke, be decomposed into two others, of which the one is that which it ought to take after the stroke, the other multiplied into the mass of the moveable, will be what is called its *force of inertia* at the moment of the stroke.

"We must not confound the *force of inertia* with *the quantity of motion lost.* To

obtain the latter, it is necessary to decompose the velocity taken by the moveable the instant after it was left free, into two, of which one is that which it really took, the other, multiplied into the mass of the moveable, will be the quantity of motion lost.

"The quantity of motion lost by the stroke is the result of three forces, viz. 1. The quantity of motion acquired, or before the collision. 2. The quantity of motion impressed by the *vis motrix*. 3. The quantity of motion equal and contrary to that which remains with the moveable after the shock. But by the definition which we have given of the force of inertia, the quantity of motion which it impresses is the result of the first and last of the three forces we have been speaking of. Therefore, the quantity of motion lost is the resultant of the quantity of motion produced by the *vis motrix*, and of the quantity of motion produced by the force of inertia.

"'Je dois remarquer,' says Euler, in his Sixty-sixth Letter to a German Princess, 'que c'est nommer fort mal-à-propos *force*, cette qualite des corps par laquelle ils restent dans leurs etat; cur si l'on comprend sous le mot *force* tout ce qui est capable de changer l'etas des corps la qualitè par la quelle ils se conservent dans le leur est plutôt l'opposè d'une *force*. C'est done par abus que quelques auteurs donnent le nom de force a l'inertié qui est cette qualitè, et qu'ils la nomment *force d'inertie*. Cet abus peut jeter dans des erreurs fort grossières.'

"This observation of Euler is striking; but it is easy to avoid these errors, by distinguishing that which we name simply *inertia*, from the *force of inertia*. Inertia is only a property which cannot be introduced into any calculation; but the force of inertia is a *quantity* susceptible of an exact appreciation. Inertia is simply the property which every body has of remaining in its state of rest, or of uniform and rectilinear motion; and the force of inertia is the quantity of motion which such body impresses on any other body that causes it to change its state. The force of inertia has therefore in perfect truth, the character of whatever we name force in general, that is to say, of every thing which changes the state of rest or of motion of bodies; for, since it is a quantity of motion impressed, it necessarily changes the state of the body which impresses it; and as to the state of the body which it acts upon, it is also changed at the same time; but it is by the re-action of the other body, a reaction which is nothing else in its turn than the force of inertia of that other body. Thus the state of each of the two striking bodies is changed by the force of inertia of the other, to which it imparts itself an equal quantity of motion in a contrary direction by its own proper force."

INE'RTLY. *ad.* Sluggishly; dully (*Pope*).

INESCA'TION. *s.* (*in* and *esca.* Latin.) The act of baiting.

IN E'SSE is applied to things which are actually existing. Authors make a difference between a thing *in esse*, and a thing *in posse*: a thing that is not, but may be, they say is *in posse*, or *potentia*; but a thing apparent and visible, they say is *in esse*, that is, has a real being *eo instanti*; whereas the other is casual, and at best but a possibility.

INE'STIMABLE. *a.* (*inestimabilis*, Latin.) Too valuable to be rated; transcending all price (*Boyle*).

INE'VIDENT. *a.* (*inevident*, French.) Not plain; obscure: not in use (*Brown*).

INEVITABI'LITY. *s.* (from *inevitable.*) Impossibility to be avoided; certainty (*Bra.*)

INE'VITABLE. *a.* (*inevitabilis*, Latin.) Unavoidable; not to be escaped (*Dryden*).

INE'VITABLY. *ad.* (from *inevitable.*) Without possibility of escape (*Bentley*).

INEXCU'SABLE. *a.* (*inexcusabilis*, Latin.) Not to be excused; not to be palliated by apology (*Swift*).

INEXCU'SABLENESS. *s.* Enormity beyond forgiveness or palliation (*South*).

INEXCU'SABLY. *ad.* (from *inexcusable.*) To a degree of guilt or folly beyond excuse (*Brown*).

INEXHA'LABLE. *a.* (*in* and *exhale.*) That cannot evaporate (*Brown*).

INEXHA'USTED. *a.* (*in* and *exhausted.*) Unemptied; not possible to be emptied (*Dryden*).

INEXHA'USTIBLE. *a.* Not to be drawn all away; not to be spent (*Locke*).

INEXI'STENT. *a.* (*in* and *existent.*) Not having being; not to be found in nature (*Boyle*).

INEXI'STENCE. *s.* (*in* and *existence.*) Want of being; want of existence (*Broome*).

INE'XORABLE. *a.* (*inexorable*, French; *inexorabilis*, Latin.) Not to be intreated; not to be moved by intreaty (*Rogers*).

INEXPE'DIENCE. } *s.* (*in* and *expediency.*) Want of fitness; want of propriety; unsuitableness to time or place; inconvenience (*Sanderson*).
INEXPE'DIENCY. }

INEXPE'DIENT. *a.* (*in* and *expedient.*) Inconvenient; unfit; improper (*Smalridge*).

INEXPE'RIENCE. *s.* (*inexperience*, Fr.) Want of experimental knowledge (*Milton*).

INEXPE'RIENCED. *a.* (*inexpertus*, Latin.) Not experienced.

INEXPE'RT. *a.* (*inexpertus*, Latin.) Unskilful; unskilled (*Milton*).

INE'XPIABLE. *a.* (*inexpiable*, French.) 1. Not to be atoned. 2. Not to be mollified by atonement (*Milton*).

INE'XPIABLY. *ad.* (from *inexpiable.*) To a degree beyond atonement (*Roscommon*).

INE'XPLEABLY. *ad.* (*in* and *expleo*, Lat.) Insatiably: not in use (*Sandys*).

INE'XPLICABLE. *a.* (*in* and *explico*, Lat.) Incapable of being explained; not to be made intelligible (*Newton*).

INE'XPLICABLY. *ad.* (from *inexplicable.*) In a manner not to be explained.

INEXPRE'SSIBLE. *a.* (*in* and *express.*) Not to be told; unutterable (*Stillingfleet*).

INEXPRE'SSIBLY, *ad.* (from *inexpressible,*) To a degree or in a manner not to be uttered; unutterably (*Hammond*).

INEXPU'GNABLE. *a.* (*inexpugnabilis,* Lat.) Impregnable; not to be taken by assault; not to be subdued (*Ray*).

INEXTI'NGUISHABLE. *a.* (*in* and *extinguo,* Latin.) Unquenchable (*Grew*).

INE'XTRICABLE. *a.* (*inextricabilis.* Lat.) Not to be disentangled; not to be cleared. (*Blackmore.*)

INE'XTRICABLY. *ad.* (from *inextricable.*) To a degree of perplexity not to be disentangled (*Bentley*).

To INE'YE. *v. n.* (*in* and *eye.*) To inoculate; to propagate trees by the insision of a bud into a foreign stock (*Philips*).

INFALLIBI'LITY, } *s.* (*infallibilité,* Fr.
INFA'LLIBLENESS. } from *infallible.*) Inerrability; exemption from error (*Tillotson*).

INFA'LLIBLE. *a.* (*infallible,* Fr.) Privileged from error; incapable of mistake; not to be misled or deceived; certain (*South*).

INFA'LLIBLY. *ad.* (from *infallible.*) 1. Without danger of deceit; with security from error (*Smalridge*). 2. Certainly (*Rogers*).

To INFA'ME. *v. a.* (*infamo,* Latin.) To represent to disadvantage; to defame; to censure publickly (*Bacon*).

I'NFAMOUS. *a.* (*infamis,* Latin.) Publickly branded with guilt; openly censured; of bad report (*Ben Jonson*).

I'NFAMOUSLY. *ad.* (from *infamous.*) 1. With open reproach; with public notoriety of reproach. 2. Shamefully; scandalously (*Dryden*).

I'NFAMOUSNESS. } *s.* (*infamia,* Lat.) Pub-
I'NFAMY. } lic reproach notoriety of bad character (*K. Charles*).

I'NFANCY. *s.* (*infantia,* Latin.) 1. The first part of life (*Hooker*). 2. Civil infancy, reaching to twenty-one. 3. First age of any thing; beginning; original; commencement (*Arbuthnot*).

Fred. Hoffman says, that the human species are *infants* until they begin to talk, and *children* to the age of puberty.

Infancy (*infantia, a non fando,* literally *the period of speechlessness*). The first stage of life; by different physiologists extended to very different periods, some terminating it with the second year after birth, and others prolonging it to the seventh. The last appears to be the most correct arrangement, and best comports with the scale of infancy as drawn by the most able politicians.

During infancy the various parts of the body are disproportioned, and the organs, from weakness, incapable of those functions which, in future life, they are designed to perform. The head, the liver, and pancreas are much larger in proportion, than in advanced periods, and their secretions more copious. The bile is very inert; the heart is stronger and larger than in future life; the arteries fuller and more active: the quantity of blood sent through the heart of an infant in a given time, is also more in proportion than in adults. Though these circumstances are not without utility and subservient to the growing state, yet the imperfection attending them subjects this period of life to many injuries and dangers from which a more perfect state is exempted.

The vigour of children's constitutions depends greatly on that of their mothers'. Healthy women, who accustom themselves to exercise and air, and whose diet is firm and invigorating, alone bring forth children perfectly healthy.

As soon as the child is born the mucus with which its body is covered should be removed by purified soap and water: the exsiccation of the mucus upon its cuticle will excoriate it, and render it irritable and feverish. After examination to ascertain whether it possess any accidental injury, or natural imperfection, the navel-string should be loosely folded in a dry rag, the head and body loosely dressed, and the growth and future formation left to nature.

A variety of treatises have been written of late, upon a popular plan, and the greater part of them, no doubt, with the most benevolent intentions upon the management, diet and diseases of children; which have too generally rendered intricate what is naturally simple; confused rather than facilitated the mother by length of reasoning and multiplicity of advice; and terrified rather than consoled her by a long list of the most excruciating and dangerous diseases, which she is induced hourly to expect, and notwithstanding all the instruction she has imbibed, still knows not how to ward off.

Every writer has set his face sturdily against the practice of bringing up infants by hand, or of committing them to a hireling wet-nurse. To object to the first practice is almost useless: the rich never do it because they can afford (if necessary) the expense of a wet-nurse: and the poor as seldom because the providence of nature has rendered it cheaper for them to suckle their children than to support them in any other way.

With respect to the second practice, to object to it is almost as futile, unless such writers could operate an entire change in the customs and fashion of the times; unless they could restore to us our good old hours of rising and resting; of exercise and meals; and induce the exhausted mother to be at home at other periods than those in which her house is as thickly crowded with company as a slave-ship or an electioneering booth. While this absurd fashion continues, and the giddy matron is resolved to plunge into it, the very best thing she can do, is to entrust her infant to a milky fount less feverish and acescent than her own. Let her, at least, at noon, and before the *morning of fashion* commences, apply herself for a short time, to the very necessary duty of superintendance: let her in the first instance be careful as to the nurse she selects, and after-

wards never suffer her to be ruined, and to ruin the infant committed to her, by indulgences which at first the nurse never thought of, but which she will afterwards be found, for ever craving, and at length imperiously demanding, under a very mistaken idea that her own personal services are of so much importance that she cannot be exchanged for another.

When however, the mother will consent to lead a life of reason and domestic quiet for the first nine or ten months after her confinement, and where her constitution has neither suffered in health from her own excesses of pleasure, nor from those of her ancestors, there can be no doubt that she has a much fairer chance of securing the comfort and health of her offspring by suckling it herself than by any other mode of rearing it whatever.

Upon the subject of dress little needs be said in the present day. Here at least we are for the most part correct. Light easy clothing, sufficient to keep the body moderately warm and to allow a free use of the limbs, is all that is wanted, and all that is at present the fashion. Cleanliness is also well attended to in general: and whatever be the diseases of infancy common among us from mismanagement in other respects, we have reason to believe that the exercise of the two virtues of proper clothing and proper cleanliness atone for a variety of sins; and not only prevent a multitude of evils beneath which the poor infant would be otherwise a sufferer, but mitigate many of those which he actually sustains.

A third benefit in the modern mode of nursing children results from the full impresssion which seems to exist in every mother's mind of the high consequence of fresh air and regular exercise. May the impression long remain in its utmost force. It is of consequence to more than a single generation. For diseases contracted in infancy, or constitutional debilities of even a worse because of a more inveterate character, are not always lost with the returning health of the sick infant. Rickets, it is not improbable, in one generation, predispose to rickets in a succeeding; and we know that scrofula does so of both: which the period of infancy is peculiarly susceptible.

But to treat individually under this article of all the diseases to which infants are peculiarly prone, would be to be guilty of a gross and unnecessary repetition; since consistently with the plan we have prescribed to ourselves, they must also of necessity be treated of individually under their respective names. Every stage of life is liable to its peculiar character of diseases. In infancy the secretory and lymphatic systems are chiefly attacked, and whatever other symptoms occur or other organs are affected such facts are rather the result of sympathetic action, than an idiopathic and primary malady. In manhood the sanguiferous system is the chief theatre of morbid influence; and in senility the nervous. Hence some nosologists, as Dr. Macbride, for example, have derived their classification partly from sexual distinction, and partly from the different stages of life, infantile diseases constituting a distinct class. Under Macbride's nosology, this class is divided into two orders a general and local, the first including the following seven genera of diseases:

1. Colica meconialis—Colic from retention of meconium.
2. Colica lactantium—Colic from imperfect milk.
3. Diarrhœa infantium—Infantile Diarrhœa.
4. Alphthœ—Thrush.
5. Eclampsia—Epilepsy.
6. Atrophia—Atrophy.
7. Rachitis—Rickets.

The second order, or that comprising local diseases extends to the five following:

1. Imperforatio—Imperforation.
2. Anchyloglossum—Tongue-tie.
3. Aurigo—Infantile Jaundice.
4. Purpura—Tetters.
5. Crusta lactea—Scald-head.

This enumeration of infantile diseases is certainly incomplete, but nature has laid a foundation for some such classification, and when rendered more perfect by minuter attention, it may not be without its use. It is not necessary as we have already observed to describe or even define these diseases in the present place, as they will be found *individually* under their respective names, and *generally* under the article NOSOLOGY.

It becomes us however to notice one disease of very serious consequence to which infants are subject because not only is it omitted in the preceeding classification, but in many of the most popular treatises on infantile diseases in the present day, and that is *hydrocephalus* or water in the head. There is some difficulty in distinguishing this disease in its early stages from general fever produced by external causes; since from the easier excitement of the infant for a degree of sympathetic fever exists in this species of hydrops which is not usually traced in subsequent life. Yet the mode of treatment will not in general be found very different from that of the general train of infantile fevers proceeding from other causes: for free evacuations from the bowels are equally indispensable in all.

The chief course of the complaints of children is congestion, or an undue accumulation in the stomach and intestines. Mucus is usually produced in a very considerable quantity, and it is this excess which lays a foundation for worms, diarrhœas, and convulsions; and the weaklier the infant the greater the morbid superabundance. Hence emetics and cathartics are the chief remedies during the infant stage of life, in which the most active drastics are borne with ease and even advantage. A child may more safely

take five grains of calomel than many adults; and often two or three grains of cambogia will not produce a considerable discharge. Suffocation considered, as a disease of children is, we apprehend, for the most part the creature of art, the mere effect of indulgence arising from undue warmth and still more frequently from undue plenitude.

The prophylactic management of children is not a very abstruse subject. Early hours, moderate warmth, exercise in the open air, to as great a degree as their strength admits, with a proper attention to their diet, and a due regulation of the alvine discharges, comprises the whole. The medicines employed should be few and simple. Their stomachs abound with acids which change the bile to a green colour, and hence tinge the stools with the same hue. The anxious parent on the appearance of this, flies to absorbents; but while the child continues lively and cheerful, and the discharges are neither too numerous nor too few, no remedy is necessary. In early infancy the usual number of motions is three, four, or five, in twenty-four hours. They are fewer afterwards.

INFA'NGTHEF. A privilege or liberty granted unto lords of certain manors to judge any thief taken within their fee (*Cowell*).

I'NFANT. *s.* (*infans*, Latin). 1. A child from the birth to the end of the seventh year (*Roscommon*). 2. (In law). A young person to the age of one and twenty.

INFANT. From the observations daily made on the actions of infants, as to their arriving at discretion, the laws and customs of every country have fixed upon particular periods, on which they are presumed capable of acting with reason and discretion; in our law the full age of man or woman is 21 years. 3 Bac. Albr. 118.

The ages of male and female are different for different purposes: a male at 12 years of age may take the oath of allegiance; at 14 is at discretion, and therefore may consent or disagree to marriage, may choose his guardian, and if his discretion is actually proved, may make his testament of his personal estate; at 17 he may be a procurator or an executor; and at 21 is at his own disposal, and may alien his lands, goods, and chattels. A female at seven years of age may be betrothed or given in marriage; at nine is entitled to dower; and at 12 is of years of maturity, and therefore may consent or disagree to marriage, and if proved to have sufficient discretion may bequeath her personal estate; at 14 is at years of legal discretion, and may choose a guardian; at 17 may be executrix; and at 21 may dispose of herself and her lands. 1 Black. 463.

An infant is capable of inheriting, for the law presumes him capable of property: also an infant may purchase, because it is intended for his benefit, and the freehold is in him till he disagrees thereto, because an agreement is presumed, it being for his benefit, and because the freehold cannot be in the grantor contrary to his own act, nor can be in obeyance, for then a stanger would not know against whom to demand his right; and if at his full age the infant agrees to the purchase, he cannot afterwards avoid it; but if he dies during his minority his heirs may avoid it, for they shall not be found by the contracts of a person who wanted compacity to contract. Co. Litt. 2.

As to infants being witnesses, there seems to be no fixed time at which children are excluded from giving evidence; but it will depend in a great measure on the sense and understanding of the children, as it shall appear on examination in court. Bull. N. P. 293.

And where they are admitted, concurrent testimony seems peculiarly desirable. 4 Bla. 214.

An infant is not bound by his contract to deliver a thing; so if one deliver goods to an infant upon a contract, &c. knowing him to be an infant, he shall not be chargeable in trover and conversion, or any other action for them; for the infant is not capable of any contract but for necessaries, therefore such delivery is a gift to the infant; but if an infant, without any contract, wilfully takes away the goods of another, trover lies against him; also it is said, that if he takes the goods under pretence that he is of age, trover lies, because it is a wilful and fraudulent trespass. 1 Sid. 129.

Infants are disabled to contract for any thing but necessaries for their person, suitable to their degree and quality; and what is necessary must be left to the jury. Co. Litt. 172.

An infant, knowing of a fraud, shall be as much bound as if of age. 13 Vin. Abr. 536.

But it is held that this rule is confined to such acts only as are voidable; and that a warrant of attorney given by an infant being absolutely void, the court will not confirm it, though the infant appeared to have given it, knowing it was not good, and for the purpose of collusion.

As to acts of infants being void, or only voidable, there is a diversity between an actual delivery of the thing contracted for, and a bare agreement to deliver it; the first is voidable, but the last absolutely void.

As necessaries for an infant's wife are necessaries for him, he is chargeable for them, unless provided before marriage; in which case he is not answerable, though she wore them afterward. 1. Str. 168.

An infant is also liable for the nursing of his lawful child.

Where goods are furnished to the son, he is himself liable if they are necessaries. If tradesmen deal with him, and he undertakes to pay them, they must resort to him for payment; but if they furnished the infant on

the credit of his father, the father only is liable. 2 Esp. 471.

With respect to education, &c. infants may be charged, where the credit was given bona fide to them. But where the infant is under the parent's power, and living in the house with them, he shall not be liable even for necessaries. 2 Black. Rep. 1325.

If a taylor trusts a young man, under age, for clothes to an extravagant degree, he cannot recover; and he is bound to know whether he deals at the same time with any other taylor. 1 Esp. Rep. 212.

If one lends money to an infant to pay a debt for necessaries, and he pays it, although he is not bound in law, yet he is in equity; but if the infant misapplies the money it is at the peril of the lender.

A promissory note given by an infant for board and lodging, and for teaching him a trade, is valid, and will support an action for the money. 1 T. R. 41.

And debts contracted during infancy are good considerations to support a promise made to them when a person is of full age; but the promise must be express.

A bond without a penalty for necessaries will bind an infant, but not a bond with a penalty. Esp. Rep. 164.

Legacies to infants cannot be paid either to them or their parents.

An infant cannot be a juror, neither can he be an attorney, bailiff, factor, or receiver. Co. Lit. 172.

By the custom of London an infant unmarried, and above the age of 14, if under 21, may bind himself apprentice to a freeman of London, by indenture with proper covenants, which covenants, by the custom of London, will be as binding as if of age.

If an infant draws a bill of exchange, yet he shall not be liable on the custom of merchants; but he may plead infancy in the same manner as he may to any other contract.

An infant cannot be sued but under the protection and joining the name of his guardian; but he may sue either by his guardian, or his next friend, who is not his guardian. Co. Lit. 135.

An action on an account stated will not lie against an infant, though it should be for necessaries. Co. Lit. 172.

I'NFANT. *a.* Not mature; a state of initial imperfection (*Shakspeare*).

INFA'NTA. *s.* (Spanish.) A princess descended from the royal blood of Spain.

INFA'NTICIDE. *s.* (*infanticidium*, Latin.) The slaughter of the infants by Herod.

I'NFANTILE. *a.* (*infantilis*, Latin.) Pertaining to an infant (*Derham*).

INFANTRY, in military affairs, the whole body of foot-soldiers, whether independent companies or regiments. The word takes its origin from one of the infantas of Spain, who, finding that the army commanded by the king her father had been defeated by the Moors, assembled a body of foot-soldiers, and with them engaged and totally routed the enemy. In memory of this event, and to distinguish the foot-soldiers, who were not before held in much consideration, they received the name of Infantry.

Heavy-armed INFANTRY, among the ancients were such as wore a complete suit of armour, and engaged with broad shields and long spears. They were the flower and strength of the Grecian armies, and had the highest rank of military honour.

Light-armed INFANTRY, among the ancients, were designed for skirmishes, and for fighting at a distance. Their weapons were arrows, darts, or slings.

Light INFANTRY, among the moderns, have only been in use since the year 1656. They have no camp-equipage to carry, and their arms and accoutrements are much lighter than those of the infantry. Light infantry are the eyes of a general, and the givers of sleep and safety to an army. Wherever there is found light cavalry, there should be light infantry.

INFA'RCTION. *s.* (*in* and *farctio*, Latin.) Stuffing; constipation (*Harvey*).

To INFA'TUATE. *v. a.* (*infatuo*, from *in* and *fatuus*, Latin.) To strike with folly; to deprive of understanding (*Clarendon*).

INFATUA'TION. *s.* (from *infatuate*.) The act of striking with folly; deprivation of reason (*South*).

INFA'USTING. *s.* (from *infaustus*, Latin.) The act of making unlucky (*Bacon*).

INFE'ASIBLE. *a.* (*in* and *feasible*.) Impracticable; not to be done (*Glanville*).

To INFE'CT. *v. a.* (*infectus*, Latin.) 1. To act upon by contagion; to affect with communicated qualities; to hurt by contagion; to taint (*Milton*). 2. To fill with something hurtfully contagious (*Shakspeare*).

INFE'CTION. *s.* (*infection*, Fr. *infectio*, Latin.) Contagion; mischief by communication; taint; poison. See CONTAGION.

INFE'CTIOUS. *a.* (from *infect*.) Contagious; influencing by communicated qualities (*Temple*).

INFE'CTIOUSLY. *ad.* Contagiously (*Sha.*)

INFE'CTIOUSNESS. *s.* The quality of being infectious; contagiousness.

INFE'CTIVE. *a.* (from *infect*.) Having the quality of acting by contagion (*Sidney*).

INFECU'ND. *a.* (*infœcundus*, Latin.) Unfruitful; infertile (*Derham*).

INFECU'NDITY. *s.* (*infecunditas*, Latin.) Want of fertility; barrenness.

INFELI'CITY. *s.* (*infelicitas*, Latin.) Unhappiness; misery; calamity (*Watts*).

To INFE'R. *v. a.* (*infero*, Latin.). 1. To bring on; to induce (*Harvey*). 2. To infer is nothing but by virtue of one proposition laid down as true, to draw in another as true (*Locke*). 3. To offer, to produce; not in use (*Shakspeare*).

I'NFERENCE. *s.* (*inference*, French; from *infer*.) Conclusion drawn from previous arguments (*Watts*).

INFERIÆ, sacrifices offered by the Romans to the *Dii Manes*, or the souls of deceased heroes or other illustrious persons, or even any relation or person whose memory was held in veneration. These sacrifices consisted of honey, water, wine, milk, the blood of victims, variety of balsamic unguents, chaplets, and loose flowers. The victims upon these occasions were generally of the smaller cattle, though in ancient times they sacrificed slaves or captives.

INFE'RIBLE. *a.* (from *infer.*) Deducible from premised grounds (*Brown*).

INFERIOR, or INTERIOR PLANETS, in astronomy, those whose orbits are nearer the sun than the orbit of the earth.

INFERIO'RITY. *s.* (from *inferiour.*) Lower state of dignity or value (*Dryden*).

INFE'RIOUR. *a.* (*inferior*, Latin.) 1. Lower in place. 2. Lower in station or rank of life (*South*). 3. Lower in value or excellency (*Dryden*). 4. Subordinate (*Watts*).

INFERIOR PERIANTH. In botany. Inclosing the germ; or, having the germ above the receptacle: opposed to superior, inferior germ. Placed below the perianth.—An inferior perianth implies a superior germ; and a superior perianth implies an inferior germ. This happy distinction was originally Tournefort's: but his expression of *calyx abit in fructum*, and *pistillum abit in fructum*, was by no means so clear as Linneus's *germen superum* and *inferum*. To understand the difference, we must observe the situation of the perianth or germ with respect to the receptacle. This distinction might be exemplified in innumerable instances: the inferior flower or perianth, and the superior fruit or germ, are in no plants more evident than in cucumber, melon, gourd, bryony and others of the class monæcia, and the order syngenesia.

INFE'RIOUR. *s.* One in a lower rank or station than another (*South*).

INFE'RNAL. *a.* (*infernal*, French.) Hellish; tartarean; detestable (*Dryden*).

INFERNAL GLASS, a name given to the *bolt-head*, when its stem is continued downward into the body of the glass vessel, and left open only by a very small orifice.

INFERNAL SALT, a name by some writers given to nitre.

INFERNAL STONE. See LAPIS INFERNALIS, and SILVER.

INFE'RTILE. *a.* (*infertile*, French.) Unfruitful; not productive; infecund (*Gov. of Tongue*).

INFERTI'LITY. *s.* (*infertilité*, French.) Unfruitfulness; want of fertility (*Hale*).

To INFEST. *v. a.* (*infesto*, Latin.) To harass; to disturb; to plague (*Hooker*).

INFESTI'VITY. *s.* (*in* and *festivity.*) Mournfulness; want of cheerfulness.

INFE'STRED. *a.* (*in* and *fester.*) Rankling; inveterate: obsolete (*Spenser*).

INFEUDA'TION. *s.* (*in* and *feudum*, Lat.) The act of putting one in possession of a fee or estate (*Hale*).

I'NFIDEL. *s.* (*infidelle*, Fr.) An unbeliever; a miscreant; a pagan; one who rejects christianity (*Hooker*).

INFIDE'LITY. *s.* (*infidelité*, French.) 1. Want of faith (*Taylor*). 2. Disbelief of christianity (*Addison*). 3. Treachery; deceit (*Spectator*).

INFIDELITY, considered as a disbelief of christianity, or rather as a kind of semi-Atheism, has always found *some* advocates; and for this it is no way difficult to assign a reason. "Men love darkness rather than light, because their deeds are evil; neither will they come to the light lest their deeds should be reproved."

A new sect of Infidels has arisen in the present age, who, with a boldness unknown to their predecessors, not only reject religion as *false*, but condemn it as *pernicious*. The great majority of former unbelievers were so far from denying its *usefulness*, that they represented it as an invention of statesmen for the very purpose of giving aid to morality, and efficacy to the laws: but some of our modern infidels declare open war against every principle and form of religion, natural as well as revealed, as hostile to morality, and therefore destructive of the happiness of the human race.

Animated by numbers and emboldened by success, the Infidels of the present day have given a new direction to their efforts, and impressed a new character on the ever growing mass of their impious speculations.

By uniting more closely with each other, by giving a sprinkling of irreligion to all their literary productions, they aim to engross the formation of the public mind, and, amidst the warmest professions of attachment to virtue, to effect an entire disruption of morality from religion. Pretending to be the teachers of virtue and the guides of life, they propose to revolutionize the morals of mankind, to regenerate the world by a process entirely new, and to rear the temple of virtue, not merely without the aid of religion, but on the renunciation of its principles and the derision of its sanctions. Their party has derived a great accession of numbers and strength, from events the most momentous and astonishing in the political world, which have divided the sentiments of Europe betwixt hope and terror, and, however they may issue, have, for the present, swelled the ranks of Infidelity. So rapidly, indeed, has it advanced since this crisis, that a great majority on the continent, and in England a considerable proportion, of those who pursue literature as a profession, may justly be considered as the open or disguised abettors of Atheism.

With respect to the sceptical and religious systems, the inquiry at present is not so much which is the truest in speculation, as which is the most useful in practice; or in other words, whether morality will be best promoted, by considering it as part of a great and comprehensive law, emanating from the will of a supreme, omnipotent legislator: or as a mere expedient adapted to our present situation, enforced by no other motives than those which arise from the prospects and interests of the present state.

The sceptical or irreligious system subverts the whole foundation of morals. It may be affirmed as a maxim, that no person can be required to act contrary to his greatest good, or

his highest interest, comprehensively viewed in relation to the whole duration of his being. It is often our duty to forego our own interest partially; to sacrifice a smaller pleasure for the sake of a greater; to incur a present evil in pursuit of a distant good of more consequence: in a word, to arbitrate, among interfering claims of inclination, is the moral arithmetic of human life. But to risque the happiness of the whole duration of our being in any case whatever, admitting it to be possible, would be foolish, because the sacrifice must, by the nature of it, be so great as to preclude the possibility of compensation.

As the present world upon sceptical principles, is the only place of recompence, whenever the practice of virtue fails to promise the greatest sum of present good, cases which often occur in reality, and much oftener in appearance, every motive to virtuous conduct is superseded, a deviation from rectitude becomes the part of wisdom; and should the path of virtue, in addition to this, be obstructed by disgrace, torment or death, to persevere would be madness and folly, and a violation of the first and most essential law of nature. Virtue on these principles, being in numberless instances, at war with self-preservation, never can or ought to become a fixed habit of the mind.

The system of Infidelity is not only incapable of arming virtue for great and trying occasions; but leaves it unsupported in the most ordinary occurrences. In vain will its advocates appeal to a moral sense, to benevolence and sympathy; in vain will they expatiate on the tranquillity and pleasure attendant on a virtuous course; for it is undeniable that these impulses may be overcome, and though you may remind the offender, that in disregarding them he has violated his nature, and that a conduct consistent with them is productive of much internal satisfaction; yet, if he reply that his taste is of a different sort, that there are other gratifications which he values more, and that every man must choose his own pleasures, the argument is at an end.

Rewards and punishments awarded by an omnipotent Being, afford a palpable and pressing motive, which can never be neglected without renouncing the character of a rational creature; but tastes and relishes are not to be prescribed.

A motive in which the reason of man shall acquiesce, enforcing the practice of virtue, at all times and seasons, enters into the very essence of moral obligation; modern Infidelity supplies no such motives; it is, therefore, essentially and infallibly a system of enervation, turpitude and vice.

This chasm in the construction of morals, can only be supplied by the firm belief of a rewarding and avenging Deity, who binds duty and happiness, though they may seem distant, in an indissoluble chain, without which, whatever usurps the name of virtue, is not a principle, but a feeling, not a determinate rule, but a fluctuating expedient, varying with the tastes of invividuals, and changing with the scenes of life.

Nor is this the only way in which infidelity subverts the foundation of morals. All reasoning on morals, pre-supposes a distinction betwixt inclinations and duties, affections and rules: the former prompt, the latter prescribe; the former supply motives to action, the latter regulate and control it. Hence, it is evident, if virtue has any just claim to authority, it must be under the latter of these notions, that is, under the character of a law. It is under this notion, in fact, that its dominion has ever been acknowledged to be paramount and supreme.

But without the intervention of a superior will, it is impossible there should be any moral law, except in the lax, metaphorical sense in which we speak of the laws of matter and motion: men being essentially equal, morality is on these principles, only a stipulation or silent compact, into which every man is supposed to enter, as far as suits his convenience, and for the breach of which he is accountable to nothing but his own mind. His own mind is his law, his tribunal and his judge.

Two consequences, the most disastrous to society, will inevitably follow the general prevalence of this system: the frequent perpetration of great crimes, and the total absence of great virtues.

1. In those conjunctures which tempt avarice or inflame ambition, when a crime flatters with the prospect of impunity, and the certainty of immense advantage, what is to restrain an Atheist from its commission? To say that remorse will deter him is absurd; for remorse, as distinguished from pity, is the sole offspring of religious belief, the extinction of which is the great purpose of the infidel philosophy.

The dread of punishment or infamy from his fellow creatures, will be an equally ineffectual barrier, because crimes are only committed under such circumstances as suggest the hope of concealment; not to say that crimes themselves will soon lose their infamy and their horror, under the influence of that system which destroys the sanctity of virtue, by converting it into a low calculation of worldly interest. Here the sense of an ever present Ruler, and of an avenging Judge, is of the most awful and indispensible necessity, as it is that alone which impresses on all crimes the character of folly, shews that duty and interest in every instance coincide, and that the most prosperous career of vice, the most brilliant successes of criminality, are but an accumulation of wrath against "the day of wrath."

As the frequent perpetration of great crimes is an inevitable consequence of the diffusion of sceptical principles, so to understand this consequence in its full extent, we must look beyond their immediate effects, and consider the disruption of social ties, the destruction of confidence, the terror, suspicion and hatred, which must prevail in that state of society in which barbarous deeds are familiar. The tranquillity which pervades a well ordered community, and the mutual good offices which bind its members together, is founded on the implied confidence in the indisposition to annoy, in the justice; humanity, and moderation of those among whom we dwell; so that the worst consequence of crimes is, that they impair the stock of public charity and general tenderness. The dread and hatred of our species would infallibly be grafted on a conviction that we were exposed, every moment to the surges of an unbridled ferocity, and that nothing but the power of the magistrate stood between us and the daggers of assassins. In such a state, laws deriving no support from public manners, are unequal to the task of curb-

ing the fury of the passions, which from being concentrated into selfishness, fear, and revenge, acquire new force; terror and suspicion beget cruelty, and inflict injuries by way of prevention, pity is extinguished in the stronger impulse of self-preservation; the tender and generous affections are crushed, and nothing is seen but the retaliation of wrongs, the fierce and unmitigated struggle for superiority. This is but a faint sketch of the incalculable calamities and horrors we must expect, should we be so unfortunate as ever to witness the triumph of modern infidelity.

2. This system is a soil as barren of great and sublime virtues, as it is prolific in crimes. By great and sublime virtues are meant, those which are called into action on great and trying occasions, which demand the sacrifice of the dearest interests and prospects of human life, and sometimes of life itself; the virtues, in a word, which by their rarity and splendour draw admiration, and have rendered illustrious the character of patriots, martyrs, and confessors. It requires but little reflection to perceive, that whatever veils a future world, and contracts the limits of existence within the present life, must tend, in a proportionable degree, to diminish the grandeur and narrow the sphere of human agency.

As well might you expect exalted sentiments of justice from a professed gamester, as look for noble principles in the man whose hopes and fears are all suspended on the present moment, and who stakes the whole happiness of his being on the events of this vain and fleeting life. If he is ever impelled to the performance of great achievements in a good cause, it must be solely by the hope of fame; a motive which, besides that it makes virtue the servant of opinion, usually grows weaker at the approach of death, and which, however it may surmount the love of existence, in the heat of battle, or in the moment of public observation, can seldom be expected to operate with much force on the retired duties of a private station.

In affirming that infidelity is unfavourable to the higher class of virtues, we are supported as well by facts as by reasoning. We should be sorry to load our adversaries with unmerited reproach; but to what history, to what record, will they appeal, for the traits of moral greatness exhibited by their disciples? Where shall we look for the trophies of infidel magnanimity, or atheistical virtue? Not that we mean to accuse them of inactivity; they have recently filled the world with the fame of their exploits; exploits of a different kind indeed, but of imperishable memory and disastrous lustre.

Though it is confessed great and splendid actions are not the ordinary employment of life, but must, from their nature, be reserved for high and eminent occasions, yet, that system is essentially defective which leaves no room for their cultivation. They are important, both from their immediate advantage and their remoter influence. They often save and always illustrate, the age and nation in which they appear. They raise the standard of morals; they arrest the progress of degeneracy; they diffuse a lustre over the path of life: monuments of the greatness of the human soul, they present to the world the august image of virtue in her sublimest form, from which streams of light and glory issue to remote times and ages; while their commemoration, by the pen of historians and poets, awakens in distant bosoms the sparks of kindred excellence.

Combine the frequent and familiar perpetration of atrocious deeds, with the dearth of great and generous actions, and you have the exact picture of that condition of society, which completes the degradation of the species; the frightful contrast of dwarfish virtues and gigantic vices, where every thing good is mean and stunted in its growth, and every thing evil is rank and luxuriant; a dead and sickening uniformity prevails, broken only at intervals by volcanic eruptions of anarchy and crime.

Hitherto we have considered the influence of Scepticism on the principles of virtue; and have endeavoured to shew that it despoils it of its dignity, and lays its authority in the dust: would our limits permit, we should now proceed to trace its influence on the *formation of character*, and to shew that it tends to corrupt the moral taste, and promote the growth of those vices which are most hostile to social happiness, namely, vanity, ferocity, and unbridled sensuality. This we cannot undertake here; but we rejoice that the task was well executed a few years ago, by Mr. Hall of Leicester, in a Sermon on Modern Infidelity, a sermon from which we have extracted the above, and which we doubt not has attracted the notice of many of our readers and furnished them with both instruction and delight: instruction, from its profound and masterly reasoning; and delight, from its brilliant and fascinating eloquence.

INFINITE, that which has neither beginning nor end: in which sense God alone is infinite. Infinite is also used to signify that which has had a beginning, but will have no end, as angels and human souls. This makes what the schoolmen call infinitum a parte post; as, on the contrary, by infinitum a parte ante, they mean that which has an end, but had no beginning.

INFINITE, is applied to quantities which are either greater or less than any assignable ones. In which sense it differs but little from the terms indefinite and indeterminate. Thus, an

INFINITE, or infinitely great line, denotes only an indefinite or indeterminate line; or a line to which no certain bounds or limits are prescribed.

INFINITE quantities. Though the idea of magnitude infinitely great, or such as exceeds any assignable quantity, does include a negation of limits, yet all such magnitudes are not equal among themselves; but besides infinite length, and infinite area, there are no less than three several sorts of infinite solidity; all of which are quantities sui generis; and those of each species are in given proportions.

Infinite length, or a line infinitely long, may be considered, either as beginning at a point, and so infinitely extended one way; or else both ways from the same point.

As to infinite surface or area, any right line infinitely extended both ways on a plane infinitely extended every way, divides that

plane into two equal parts, one on each side of the line. But if from any point in such a plane, two right lines be infinitely extended, making an angle between them; the infinite area, intercepted between these infinite right lines, is to the whole infinite plane, as that angle is to 4 right angles. And if two infinite and parallel lines be drawn at a given distance on such an infinite plane, the area intercepted between them will be likewise infinite; but yet it will be infinitely less than the whole plane; and even infinitely less than the angular or sectoral space, intercepted between two infinite lines, that are inclined, though at never so small an angle; because in the one case, the given finite distance of the parallel lines diminishes the infinity in one of the dimensions; whereas in a sector, there is infinity in both dimensions. And thus there are two species of infinity in surfaces, the one infinitely greater than the other.

In like manner there are species of infinites in solids, according as only one, or two, or as all their three dimensions, are infinite; which, though they be all infinitely greater than a finite solid, yet are they in succession infinitely greater than each other.

Infinite Series. See Series.

Infinites (Arithmetic of). See Arithmetic. Also Wallis's treatise on this subject; and another by Emerson, at the beginning of his Conic Sections; also Bulliald's treatise Arithmetica Infinitorum.

INFINITESIMALS, are certain infinitely or indefinitely small parts; as also the method of computing by them.

In the method of infinitesimals, the element by which any quantity increases or decreases, is supposed to be infinitely small, and is generally expressed by two or more terms, some of which are infinitely less than the rest, which being neglected as of no importance, the remaining terms form what is called the difference of the proposed quantity. The terms that are neglected in this manner, as infinitely less than the other terms of the element, are the very same which arise in consequence of the acceleration, or retardation, of the generating motion, during the infinitely small time in which the element is generated; so that the remaining terms express the elements that would have been produced in that time, if the generating motion had continued uniform: therefore those differences are accurately in the same ratio to each other as the generating motions or fluxions. And hence, though in this method infinitesimal parts of the elements are neglected, the conclusions are accurately true without even an infinitely small error, and agree precisely with those that are deduced by the method of fluxions.

But however safe and convenient this method may be, yet some will always scruple to admit infinitely little quantities, and infinite orders of infinitesimals, into a science that boasts of the most evident and accurate principles, as well as of the most rigid demonstrations. In order to avoid such suppositions, Newton considers the simultaneous increments of the flowing quantities as finite, and then investigates the ratio which is the limit of the various proportions which those increments bear to each other, while he supposes them to decrease together till they vanish; which ratio is the same with the ratio of the fluxions. See Maclaurin's Fluxions, in the Introduction, pa. 39. also art. 495 to 502.

INFINITIVE, in Grammar, the name of one of the moods, which serve for the conjugating of verbs.

The infinitive does not denote any precise time, nor does it determine the number, or persons, but expresses things in a loose indefinite manner; as, to teach, &c.

Hence the Latin and modern grammarians have called verbs under this mode, from this their indefinite nature, infinitives. Sanctius has given them the name of impersonals; and the Greeks that of απαρεμφατα from the same reason of their not discovering either person or number.

Infinitives, says Mr. Harris, not only lay aside the character of attributives, but they also assume that of substantives, and are distinguished with their several attributes: *e. g. Dulce et decorum est pro patria mori scire tuum nihil est, &c.*

In most languages, both ancient and modern, the infinitive is distinguished by a termination peculiar to it; as τυπτειν in the Greek, *scribere* in the Latin, *ecrire* in the French, *scrivere* Italian, &c. but the English is defective in this point; so that to denote the infinitive, we are obliged to have recourse to the article *to*: excepting sometimes when two or more infinitives follow each other.

The practice of using a number of infinitives successively, is a great but common fault in language; as, *he offered to go to teach to write* English—Indeed, where the infinitives have no dependence on each other, they may be used elegantly enough; as *to mourn, to sigh, to sink, to swoon, to die.*

INFINITUDE. *s.* (from *infinite*). 1. Infinity; immensity. 2. Boundless number.

INFINITY. *s.* The quality which denominates a thing infinite. The idea signified by the name infinity, is best examined by considering to what infinity is by the mind attributed, and then how it frames it. Finite and infinite, then, are looked upon as the modes of quantity; and attributed primarily to things that have parts, and are capable of increase or diminution by the addition or subtraction of any the least part. Such are the ideas of space, duration and number.

When we apply this idea to the Supreme Being, we do it primarily in respect of his duration and ubiquity: more figuratively, when to his wisdom, power, goodness, and

other attributes, which are properly inexhaustible and incomprehensible: for, when we call them infinite, we have no other idea of this infinity, but what carries with it some reflection on the number or the extent of the acts or objects of God's power and wisdom, which can never be supposed so great, or so many, that these attributes will not always surmount and exceed, though we multiply them in our thoughts with the infinity of endless number.

The next thing to be considered, is, how we come by the idea of infinity. Every one that has any idea of any stated lengths of space, as a foot, yard, &c. finds that he can repeat that idea, and join it to another, to a third, and so on without ever coming to an end of his additions. From this power of enlarging his idea of space, he takes the idea of infinite space, or immensity. By the same power of repeating the idea of any length of duration we have in our minds, with all the endless addition of number, we come by the idea of eternity.

If our idea of infinity be got by repeating without end our ideas; why do we not attribute it to other ideas, as well as those of space and duration? since they may be as easily and as often repeated in our minds as the other. Yet nobody ever thinks of infinite sweetness or whiteness, though he can repeat the idea of sweet or white as frequently as those of yard or day. But those ideas that have parts, and are capable of increase by the addition of any parts, afford us, by their repetition, an idea of infinity; because with the endless repetition there is continued an enlargement, of which there is no end. But it is not so in all other ideas: for, if to the perfect idea I have of white, I add another of equal whiteness, it enlarges not my idea at all. Those ideas that consist not of parts, cannot be augmented to what proportion men please, or be stretched beyond what they have received by their senses: but space, duration, and number, being capable of increase by repetition, leave in the mind an idea of an endless room for more; and so those ideas alone lead the mind towards the thought of infinity.

INFI'RM. *a.* (*infirme*, French). 1. Weak; feeble; disabled of body (*Shaks.*) 2. Weak of mind; irresolute (*Milton*). 3. Not stable; not solid (*South*).

To INFI'RM. *v. a.* (*infirmer*, French). To weaken; to shake; to enfeeble (*Raleigh*).

INFIRMARY. *s.* (*infirmerie*, French). A kind of hospital where those who are sick or lame, are properly taken care of.

INFI'RMITY *s.* (*infirmité*, Fr.) 1. Weakness of sex, age, or temper (*Rogers*). 2. Failing; weakness; fault (*Clarendon*). 3. Disease; malady (*Hooker*).

INFI'RMNESS. *s.* (from *infirm.*) Weakness; feebleness (*Boyle*).

INFIX. *v. a.* (*infixus*, Latin.) To drive in; to fasten (*Spenser*).

To INFLAME. *v. a.* (*inflammo*, Latin.) 1. To kindle; to set on fire (*Sidney*). 2. To kindle any passion (*Susan*). 3. To fire with passion (*Milton*). 4. To exaggerate; to aggravate (*Addison*). 5. To heat the body morbidly with obstructed matter. 6. To provoke; to irritate (*Decay of Piety*).

To INFLA'ME. *v. n.* To grow hot, angry, and painful by obstructed matter (*Wiseman*).

INFLA'MER. *s.* (from *inflame.*) The thing or person that inflames (*Addison*).

INFLAMMABI'LITY is that property of bodies which disposes them to kindle, or catch fire, and burn with flame.

INFLA'MMABLE. *a.* (French.) Easy to be set on flame (*Newton*).

INFLAMMABLE *Air* or *Gass.* See HYDROGEN *Gass*

INFLAMMABLES, In mineralogy, and especially under the system of Gmellin are a distinct class of bodies characterised by their solubility in oil, their smoke or flame when burnt, which is either grateful or disagreeable, innocent or deleterious, and by their colour or tint. See the article MINERALOGY.

INFLA'MMABLENESS. *s.* (from *imflammable.*) The quality of easily catching fire.

INFLAMMATION, or ACCENSION in *chemistry*, the burning of a body, attended with the emission or production of a flame.

INFLAMMATION, Spontaneous. See Combustion. In addition to the information contained in that article, we give the following particulars published in the Repertory of Arts and Manufactures, by the Rev. William Tooke, F. R. S. &c. "A person of the name of Rude, an apothecary at Bautzen, had prepared a pyrophorus from rye-bran and alum. Not long after he had made the discovery, there broke out, in the next village of Nauslitz, a great fire, which did much mischief, and was said to have been occasioned by the treating of a sick cow in the cow-house. Mr. Rude knew, that the countrymen were used to lay an application of parched rye-bran to their cattle for curing the thick neck; he knew also, that alum and rye-bran, by a proper process, yielded a pyrophorus; and now he wished to try whether parched rye-bran alone would have the same effect. Accordingly, he roasted a quantity of rye-bran by the fire, till it had acquired the colour of roasted coffee. This roasted bran he wrapped up in a linen cloth; in the space of a few minutes there arose a strong smoke through the cloth, accompanied by a smell of burning. Not long afterwards the rag grew as black as tinder, and the bran, now become hot, fell through it on the ground in little balls. Mr. Rude repeated the experiment at various times, and always with the same result. Who now will any longer doubt, that the frequency of fires in cow-houses, which in those parts are mostly wooden buildings, may not be occasioned by this common practice, of binding roasted bran about the necks of the cattle? The fire, after consuming the cattle and the shed, communicates itself to the adjoining buildings; great damage ensues; and the ignorant look for the cause in wilful and malicious firing, consequently in a capital crime."

The same author informs us, that in the spring of the year 1780, a fire was discovered on board a Russian frigate lying in the road of Cronstadt; which, if it had not been timely extinguished, would have endangered the whole fleet. After the severest scrutiny, no cause of the fire was to be found; and the matter was forced to remain without explanation, but with strong surmises of some wicked incendiary being at the bottom of it. In the month of August, in the same year, a fire broke out at the hemp magazine at St Petersburgh, by which several hundred thousand poods of hemp and flax were consumed. The walls of the magazine are of brick, the floors of stone and the rafters and covering of iron; it stands alone on an island in the Neva, on which, as well as on board the ships lying in the Neva, no fire is permitted. In St. Petersburgh, in the same year, a fire was discovered in the vaulted shop of a furrier. In these shops, which are all vaults, neither fire nor candle is allowed, and the doors of them are all of iron. At length the probable cause was found to be, that the furrier, the evening before the fire, had got a roll of new cere-cloth (much in use here for covering of tables, counters, &c. being easily wiped and kept clean), and had left it in his vault, where it was found almost consumed.

In the night between the 20th and 21st of April 1781, a fire was seen on board the frigate Maria, which lay at anchor, with several other ships, in the road off the island of Cronstadt; the fire was, however, soon extinguished; and, by the severest examination, little or nothing could be extorted concerning the manner in which it had arisen. The garrison was threatened with a scrutiny that should cost them dear; and while they were in this cruel state of suspense, an order came from the sovereign, which quieted their minds, and gave rise to some very satisfactory experiments.

It having been found, upon juridical examination, as well as private inquiry, that in the ship's cabin, when the smoke appeared, there lay a bundle of matting, containing Russian lamp-black prepared from fir-soot, moistened with hemp-oil varnish, which was perceived to have sparks of fire in it at the time of the extinction, the Russian admiralty gave orders to make various experiments in order to see whether a mixture of hemp-oil varnish and the aforementioned Russian black, folded up in a mat and bound together, would kindle of itself.

They shook 40 pounds of fir-wood soot into a tub, and poured about 35 pounds of hemp oil varnish upon it; this they let stand for an hour, after which they poured off the oil. The remaining mixture they now wrapped up in a mat, and the bundle was laid close to the cabin, where the midshipmen had their birth. To avoid all suspicion of treachery, two officers sealed both the mat and the door with their own seals, and stationed a watch of four sea-officers, to take notice of all that passed the whole night through; and as soon as any smoke should appear, immediately to give information to the commandant of the port.

The experiment was made the 26th of April, about 11 o'clock A. M. in presence of all the officers named in the commission. Early on the following day, about six o'clock A. M. a smoke appeared, of which the chief commandant was immediately informed by an officer; he came with all possible speed, and through a small hole in the door saw the mat smoking. Without opening the door, he dispatched a messenger to the members of the commission; but as the smoke became stronger, and fire began to appear, the chief commandant found it necessary, without waiting for the members of the commission, to break the seals and open the door. No sooner was the air thus admitted, than the mat began to burn with great force, and presently it burst into a flame.

The Russian admiralty, being now fully convinced of the self-enkindling property of this composition, transmitted their experiment to the Imperial Academy of Sciences; who appointed Mr. Georgi, a very learned and able adjunct of the academy, to make farther experiments on the subject. Previous to the relation of these experiments, it is necessary to observe, that the Russian fir-black is three or four times more heavy, thick, and unctuous, than that kind of painter's black which the Germans call kien-rahm. The former is gathered at Ochta, near St. Petersburgh, at Musco, at Archangel, and other places, in little wooden huts, from resinous fir-wood, and the unctuous bark of birch, by means of an apparatus uncommonly simple, consisting of pots without bottoms set one upon another; and is sold very cheap. The famous fine German kien-rahm is called in Russia Holland's black. In what follows, when raw oil is spoken of, it is to be understood of linseed oil or hemp oil; but most commonly the latter. The varnish is made of five pounds of hemp-oil boiled with two ounces and a half of minium. For wrapping up the composition, Mr. Georgi made use of coarse hemp-linen, and always single, never double. The impregnations and commixtures were made in a large wooden bowl, in which they stood open till they were wrapped up in linen.

Three pounds of Russian fir-black were slowly impregnated with five pounds of hemp-oil varnish; and when the mixture had stood open five hours, it was bound up in linen. By this process it became clotted; but some of the black remained dry. When the bundle had lain sixteen hours in a chest, it was observed to emit a very nauceous, and rather putrid smell, not quite unlike that of boiling oil. Some parts of it became warm, and steamed much; this steam was watery, and by no means inflammable. Eighteen hours after the mixture was wrapped up, one place became brown, emitted smoke, and directly afterwards glowing fire appeared. The same thing happened in a second and a third place, though other places were scarcely warm. The fire crept slowly around, and gave a thick, grey, stinking smoke. Mr. Georgi took the bundle out of the chest, and laid it on a stone pavement; when, on being exposed to the free air, there arose a slow burning flame, a span high, with a strong body of smoke. Not long afterwards there appeared, here and there, several chaps or clefts, as from a little volcano; the vapour issuing from which burst in to flame. On his breaking the lump, it burst into a very violent flame, full three feet high, which soon grew less, and then went out. The smoking and glowing fire lasted for the space of six hours; and afterwards the remainder continued to glow without smoke for two hours longer. The grey earthy ashes, when cold, weighed five ounces and a half.

In another experiment, perfectly similar to the foregoing, as far as relates to the composition and quantities, the enkindling did not ensue till 41

hours after the impregnation: the heat kept increasing for three hours, and then the accension followed. It is worthy of remark, that these experiments succeeded better on bright days than on such as were rainy; and the accension came on more rapidly.

In another experiment, three pounds of Russian fir-black were slowly impregnated with three pounds of raw hemp-oil; and the accension ensued after nine hours.

Three quarters of a pound of German rahm were slowly impregnated with a pound and a half of hemp-oil varnish. The mixture remained 70 hours before it came hot and reeking: it then gradually became hotter, and emitted a strong exhalation; the effluvia were moist, and not inflammable. The reaction lasted 36 hours, during which the heat was one while stronger, and then weaker, and at length quite ceased.

Stove or chimney soot, mostly formed from birch-wood smoke, was mingled with the abovementioned substances and tied up; the compound remained cold and quiet.

Russian fir-black, mixed with equal parts of oil of turpentine, and bound up, exhibited not the least reaction or warmth.

Birch oil, mixed with equal parts of Russian fir-black, and bound up, began to grow warm, and to emit a volatile smell; but the warmth soon went off again.

From the experiments of the admiralty and of Mr. Georgi, we learn, not only the decisive certainty of the self-accension of soot and oil, when the two substances are mixed under certain circumstances, but also the following particulars:

Of the various kinds of soot, or lamp-black, the experiments succeeded more frequently and surely with the coarser, more unctuous, and heavier, like Russian painter's black, than with fine light German rahm, or with coarse chimney-soot. In regard to oils, only those experiments succeeded which were made with drying oils, either raw or boiled. The proportions of the soots to the oils were, in the successful experiments, very various; the mixture kindled with a tenth, a fifth, a third, with an equal, and likewise with a double proportion of oil. In general, however, much more depends on the mode of mixture, and the manipulation, and, as Mr. Georgi often observed, on the weather; for in moist weather the bundles, after becoming warm, would frequently grow cold again.

The instances of spontaneous inflammation hitherto mentioned have been only of vegetable substances; but we have examples of the same thing in the animal kingdom. Pieces of woollen cloth, which had not been scoured, took fire in a warehouse. The same thing happened to some heaps of woollen yarn; and some pieces of cloth took fire in the road, as they were going to the fuller. These inflammations always took place where the matters heaped up preserve a certain degree of humidity, which is necessary to excite a fermentation; the heat resulting from which, by drying the oil, leads them insensibily to a state of ignition; and the quality of the oil, being more or less desiccative, very much contributes thereto.

The woollen stuff prepared at Sevennes, which bears the name of emperor's stuff, has kindled of itself, and burnt to a coal. It is not unusual for this to happen to woollen stuffs, when in hot summers they are laid in a heap in a room but little aired.

In June 1781, the same thing happened at a wool-comber's in a manufacturing town in Germany, where a heap of wool-combings, piled up in a close warehouse seldom aired, took fire of itself. This wool had been by little brought into the warehouse; and, for want of room, piled up very high, and trodden down, that more might be added to it. That this combed wool, to which, as is well known, rape-oil mixed with butter is used in the combing, burnt of itself, was sworn by several witnesses. One of them affirmed that, ten years before, a similar fire happened among the flocks of wool at a clothier's, who had put them into a cask, where they were rammed hard, for their easier conveyance. This wool burnt from within outwards, and became quite a coal; it was very certain that neither fire nor light had been used at the packing, consequently the above fires arose from similar causes. In like manner, very credible cloth-workers have certified, that, after they have brought wool that was become wet, and packed it close in their warehouse, this wool has burnt of itself; and very serious consequences might have followed, if it had not been discovered in time.

Nay, there are instances, though they be but rare, of human bodies being consumed by spontaneous inflammation. In the Philosophical Transactions, and in the Memoirs of the Academies of Paris and Copenhagen, it is related that an Italian lady (Countess Cornelia Bandi) was entirely reduced to ashes, except her legs; that an English woman, called Grace Pitt, was almost entirely consumed by a spontaneous inflammation of her viscera; and, lastly, that a priest of Bergamo was consumed in the same manner. These spontaneous inflammations have been attributed to the abuse of spirituous liquors; but though the victims of intemperance are indeed very numerous, these certainly do not belong to that number.

The mineral kingdom also often affords instances of spontaneous inflammation. Pyrites heaped up, if wetted and exposed to the air, take fire. Pitcoal also, laid in heaps, under certain circumstances, inflames spontaneously. M. Duhamel has described two inflammations of this nature, which happened in the magazines of Brest, in the years 1741 and 1757. Cuttings of Iron, which had been left in water, and were afterwards exposed to the open air, gave sparks, and set fire to the neighbouring bodies. For this observation we are obliged to M. de Charpentier.

The causes of these phœnomena the chemist will assign; but they are here recorded as a warning to tradesmen and others. It is evident, from the facts which have been related, that spontaneous inflammations being very frequent, and their causes very various, too much attention and vigilance cannot be used to prevent their dreadful effects. And consequently it is impossible to be too careful in watching over public magazines and storehouses, particularly those belonging to the ordnance, or those in which are kept hemp, cordage, lamp-black, pitch, oiled cloths, &c. which substances ought never to be left heaped up, particularly if they have any moisture in them. In order to prevent any accident from them, it would be proper to examine them often, to take notice if any heat is to be observed in them, and, in that case, to apply a remedy immediately. These

examinations should be made by day, it not being advisable to carry a light into the magazines: for when the fermentation is sufficiently advanced, the vapours which are disengaged by it are in an inflammable state, and the approach of a light might, by their means, set fire to the substances from whence they proceed. Ignorance of the fore-mentioned circumstances, and a culpable negligence of those precautions which ought to be taken, have often caused more misfortunes and loss than the most contriving malice: it is therefore of great importance that these facts should be universally known, that public utility may reap from them every possible advantage."

INFLAMMATION, (in medicine *inflammatio, onis, f.* from *inflammo*, to burn.) *Phlogosis.* A genus of diseases in the class *pyrexia*, and order *phlegmasiæ* of Cullen: characterized by redness, heat, pain, and tumour on the surface of the body. There are two species: 1. Phlegmone, known by inflammation of a bright red colour; tumour pointed, throbbing, and tending to suppuration. 2. Erythema, which is inflammation of a dull red colour, vanishing upon pressure, spreading unequally, with a burning pain, and tumour scarcely perceptible, ending in desquammation, or vesicles of the skin. Phlogosis often terminates in abscess, gangrene, or scirrhus.

INFLA'MMATORY. *a.* (from *inflame.*) Having the power of inflaming (*Pope*).

To INFLA'TE. *v. a.* (*inflatus*, Latin.) 1. To swell with wind (*Ray*). 2. To fill with the breath (*Dryden*).

INFLA'TED. In botany, hollow and puffed or blown up like a bladder. Applied to the perianth, as in *physalis*; to the corol, as in *calceolaria*; to the nectary, as in *cypripedium*; to the pericarp, as in *fumaria cirrhosa*, and Colutea.

INFLA'TION. *s.* (*inflatio*, Latin.) The state of being swelled with wind; flatulence (*Arbuthnot*).

To INFLE'CT. *v. a.* (*inflecto*, Latin.) 1. To bend; to turn (*Newton*). 2. To vary a noun or verb in its terminations.

INFLECTION, in optics, called also diffraction, and deflection of the rays of light, is a property of them, by reason of which, when they come within a certain distance of any body, they will either be bent from it, or towards it; being a kind of imperfect reflection or refraction.

Mr. Brougham applies the term inflection, or *inflexion*, to a ray of light, when, on its approach to a body, it is bent *inwards*; and when the ray is *turned away*, he calls it *deflexion*. For this gentleman's experiments on this subject, see *Phil. Trans.* for 1798, or *Nicholson's Journal*, Vol. I. p. 551.

INFLECTION, *Point of*, or of *contrary flexure*, in a curve, is the point or place in the curve where it begins to bend or turn a contrary way; or which separates the concave part from the convex part, and lying between the two; or where the curve changes from concave to convex, or from convex to concave, on the same side of the curve. The point of inflection is best found by the doctrine of Fluxions, after the method shewn by Agnesi, Emerson, Hutton, Rowe, Simpson, Vince, &c. A very ingenious method is given by M. Carnot, at No. lxv. of his valuable little tract on the "Infinitesimal Calculus."

INFLECTION, in grammar, the variation of nouns and verbs, in their several cases, tenses, and declensions.

INFLECTION is a general name, under which are comprehended both *conjugation* and *declension*.

INFLECTION, also denotes a modulation of the voice.

INFLE'X, or inflected. In botany, bent upwards at the end towards the stem. Applied to the leaf; and also to the calyx, when it means only bent inwards. (See *Incurvate*).

INFLE'CTIVE. *a.* (from *inflect.*) Having the power of bending (*Derham*).

INFLEXIBI'LITY. } *s.* (*inflexibilité*, Fr.
INFLE'XIBLENESS. } from *inflexible.*) 1. Stiffness; quality of resisting flexure. 2. Obstinacy; temper not to be bent.

INFLE'XIBLE. *a.* (French; *inflexibilis*, Latin.) 1. Not to be bent or incurvated (*Brown*). 2. Not to be prevailed on; immoveable (*Addison*). 3. Not to be changed or altered (*Watts*).

INFLE'XIBLY. *ad.* (from *inflexible.*) Inexorably; invariably (*Locke*).

To INFLI'CT. *v. a.* (*infligo, inflictus*, Lat. *infliger*, French.) To put in act or impose as a punishment (*Temple*).

INFLI'CTER. *s.* (from *inflict.*) He who punishes (*Government of the Tongue.*)

INFLI'CTION. *s.* (from *inflict.*) 1. The act of using punishments (*South*). 2. The punishment imposed (*Rogers*).

INFLI'CTIVE. *a.* (*inflictive*, French, from *inflict.*) That imposes a punishment.

INFLORE'SCENCE. In botany, manner of flowering. *Modus quo flores pedunculo plantæ annectuntur.* The various modes in which flowers are fastened to the plant by means of the peduncle. These are, 1. Spadix. 2. Cyme. 3. Umbel. 4. Spike. 5. Ament. 6. Strobile. 7. Corymb. 8. Raceme. 9. Panicle. 10. Thyrse. 11. Fascicle. 12. Head (capitulum). 13. Whorl (verticillus). These are all explained in their proper places.

I'NFLUENCE. *s.* (*influence*, French; *influo*, Latin.) 1. Power of the celestial aspects operating upon terrestrial bodies and affairs (*Prior*). 2. Ascendant power; power of directing or modyfying (*Sidney. Atterbury*).

To I'NFLUENCE. *v. a.* (from the noun.) To act upon with directive or impulsive power; to modify to any purpose (*Newton*).

I'NFLUENT. *a.* (*influens*, Latin.) Flowing in (*Arbuthnot*).

INFLUE'NTIAL. *a.* (from *influence.*) Exerting influence or power (*Glanville*).

INFLUE'NZA. (*influenza, æ.* f. Italian, so named because it was supposed to be produced by a peculiar influence of the stars or

the atmosphere). A species of Catarrh. (See *Catarrhus a Contagione*).

I'NFLUX. *s.* (*influxus*, Latin.) 1. Act of flowing into any thing (*Ray*). 2. Infusion; intromission (*Hale*). 3. Influence; power: not in use (*Bacon*).

INFLU'XIOUS. *a*, (from *influx*.) Influential: not used (*Howel*).

To INFO'LD. *v. a.* (*in* and *fold*.) To involve; to inwrap; to enclose with involutions (*Pope*).

To INFO'LIATE. *v. a.* (*in* and *folium*, Lat.) To cover with leaves (*Howel*).

To INFO'RM. *v. a.* (*informo*, Latin.) 1. To animate; to actuate by vital powers (*Dryden*). 2. To instruct; to supply with new knowledge; to acquaint (*Clarendon*). 3. To offer an accusation to a magistrate.

To INFO'RM. *v. a.* To give intelligence (*Shakspeare*).

IN FORMA PAUPERIS. When any man who has a just cause of suit, either in chancery or any of the courts of common law, will come before the lord keeper, master of the rolls, either of the chief justices, or chief baron, and make oath, that he is not worth five pounds, his debts paid; either of the said judges will, in his own proper court, admit him to sue in *forma pauperis*, or as a poor man, and he shall have counsel, clerk, or attorney assigned him, to do his business, without paying any fees.

INFO'RMAL. *a.* (from *inform*.) Irregular; not competent (*Shakspeare*).

INFO'RMANT. *s.* (French.) 1. One who gives information or instruction (*Watts*). 2. One who exhibits an accusation.

INFORMA'TION. *s.* (*informatio*, Latin.) 1. Intelligence given; instruction (*South*). 2. Charge or accusation exhibited. 3. The act of informing or accusing.

INFORMA'TION, in law, may be defined an accusation or complaint exhibited against a person for some criminal offence. It differs principally from an indictment in this, that an indictment is an accusation found by the oath of twelve men, but an information is only the allegation of the officer who exhibits it. Informations are of two kinds; first, those which are partly at the suit of the king, and partly at the suit of a subject, and secondly, such as are only in the name of the king: the former are usually brought upon penal statutes, which inflict a penalty on conviction of the offender, one part to the use of the king, and another to the use of the informer, and are a sort of *qui tam* or popular actions, only carried on by a criminal instead of a civil process. Informations that are exhibited in the name of the king alone are also of two kinds; first, those which are truly and properly his own suits, and filed *ex officio* by his own immediate officer, the attorney-general; secondly, those in which, though the king is the nominal prosecutor, yet it is at the relation of some private person, or common informer, and they are filed by the master of the crown-office, under the express direction of the court. And when an information is filed in either of these ways, it must be tried by a petit jury of the county where the offence arises; after which, if the defendant be found guilty, he must resort to the Court of King's Bench for his punishment. Common informers, by 18 Elizabeth, c. 5, are to pay costs in case of failure of suit upon informations, unless the judge certifies that there was a reasonable cause of proceeding.

INFO'RMER. *s.* (from *inform*.) 1. One who gives instruction or intelligence (*Swift*). 2. One who discovers offenders to the magistrate (*L'Estrange*).

Informers among the Greeks were called Συκοφανται, (*sycophants*).

INFORMES Stellæ, in astronomy, are such stars as have not yet been reduced into any constellation; otherwise called *sporades*. Hevelius and others of the moderns have reduced many of the sporades into new constellations.

INFO'RMIDABLE. *a.* (*in* and *formidibilis*, Latin.) Not to be feared; not to be dreaded.

INFO'RMITY. *s.* (from *informis*, Latin.) Shapelessness (*Brown*).

INFO'RMOUS. *a.* (*informis*, Latin.) Shapeless; of no regular figure (*Brown*).

INFO'RTUNATE. *a.* (*infortunatus*, Latin.) Unhappy (*Bacon*).

To INFRA'CT. *v. a.* (*infractus*, Latin.) To break (*Thomson*).

INFRA'CTION. *s.* (*infractio*, Latin.) The act of breaking; breach; violation (*Waller*).

INFRA'NGIBLE. *a.* (*in* and *frangible*.) Not to be broken (*Cheyne*).

INFRE'QUENCY. *s.* (*infrequentia*, Latin.) Uncommonness; rarity (*Broome*).

INFRE'QUENT. *a.* (*infrequens*, Latin.) Rare; uncommon.

To INFRI'GIDATE. *v. a.* (*in* and *frigidus*, Latin.) To chill; to make cold (*Boyle*).

To INFRI'NGE. *v. a.* (*infringo*, Latin.) 1. To violate; to break laws or contracts (*Shakspeare*). 2. To destroy; to hinder (*Waller*).

INFRI'NGEMENT. *s.* (from *infringe*.) Breach; violation (*Clarendon*).

INFRI'NGER. *s.* (from *infringe*.) A breaker; a violator (*Ayliffe*).

INFULA, in antiquity, a mitre worn by the Roman and Grecian priests upon the head.

INFUNDIBULIFORM Corol. In botany a funnel-shaped corol. Monopetala, conica, tubo imposita. Monopetalous; having a conical border, rising from a tube. As in Lithospermum, Anchusa, Cynoglossum, Pulmonaria. Asperugo, Lycopsis, Tournefortia.

INFUNDIBULUM, (*Infundibulum*, *i*, n. from infundo, to pour in). A canal that proceeds from the vulva of the brain to the pituitary gland in the sella turcica. It is sometimes impervious.

INFU'RIATE. *a.* (*in* and *furia*, Latin). Enraged; raging (*Milton*).

INFUSCA'TION. *s.* (*infuscatus*, Latin.) The act of darkening or blackening.

To INFU'SE. *v. n.* (*infuser*, Fr. *infusus*, Latin.) 1. To pour in; to instil (*Denham*). 2. To pour into the mind; to inspire (*Swift*). 3. To steep in any liquor with a gentle heat (*Bacon*). 4. To make an infusion with any ingredient: not used (*Bacon*). 5. To inspire with: not used (*Shakspeare*).

INFU'SIBLE. *a.* (from *infuse.*) 1. Possible to be infused (*Hammond*). 2. Incapable of dissolution; not fusible; not to be melted (*Brown*).

INFU'SING. (*Infusio.*) In medicine, a process that consists in pouring water of any required degree of temperature on such substances as have a loose texture, as thin bark, wood in shavings, or small pieces, leaves, flowers, &c. and suffering it to stand a certain time. The liquor obtained by the above process is called an infusion.

INFU'SION. *s.* (*infusion*, French; *infusio*, Latin.) 1. The act of pouring in; instillation (*Addison*). 2. The act of pouring into the mind; inspiration (*Hooker*). 3. Suggestion; whisper (*Swift*). 4. The act of steeping any thing in moisture without boiling (*Bac.*) 5. The liquor made by infusion (*Bac.*)

INFU'SION, in pharmacy, that operation by which the virtues of plants, roots, &c. are drawn out, by steeping them only in some convenient menstruum, and this is employed on bodies of a laxer texture than those which require decoction, and whose parts are so volatile as not to admit of boiling, without hazard of their active properties being dissipated.

Water, the direct menstruum of gums and salts, extracts readily the gummy and saline parts of vegetables. Its action, however, is not limited to these: the resinous and oily principles being, in most vegetables, so intimately blended with the gummy and saline, as to be in great part taken up along with them: some of the resinous cathartics, and most of the aromatic herbs, as well as bitters and astringents, yield to the water greatest part of their smell, taste, and medicinal virtue. Even of the pure essential oils and odorous resins of vegetables, separated from the other principles, water imbibes a part of the flavour; and, by the artificial admixture of gummy or saline matter, the whole substance of the oil or resin is made dissoluble in water.

Of pure salts water dissolves only certain determinate quantities. By applying heat, it is generally enabled to take up more than it can do in the cold, and this in proportion to the degree of heat; but, as the liquor cools, this additional quantity separates, and the water retains no more than it would have dissolved without heat. With gummy substances, on the other hand, it unites unlimitedly, dissolving more and more of them till it loses its fluidity: heat expedites the action of the water, but cannot enable it to take up more than it would do, by allowing it longer time, in the cold. The active parts extracted from most vegetables by water, and oils and resins made soluble in water by the artificial admixture of gum, partake of this property of pure gums, being dissoluble without saturation. (For the rest see PHARMACY.)

We shall here merely notice that the chief preparations under this head are as follow:

Infúsum Cátechu. A very useful mode of exhibiting the catechu in cases of diarrhœa, dysentery, fluor albus, and relaxation of the stomach. It may be given to children when they refuse the more nauseous remedies.

I. Gentianæ Compositum. A very useful tonic and stomachic bitter, to which other medicines may be added to answer particular indications. In cardialgia, arising from relaxation of the vessels separating the gastric juice; in cases where there is a want of appetite and a deficiency of bile, it may be given with advantage, and in all cases where stomachic tonics are indicated.

I. Rhei. A very mild preparation of rhubarb, which may be exhibited with success as a purgative to the delicate, and those whose bowels are easily acted on.

I. Rosæ. A most useful medicine. As a common drink it cures scarlatina in children, proving antiseptic and gently aperient.

I. Sennæ. A useful vehicle for other purgative medicines. To these, which have been long established, the new London Pharmacopoeia has added,

I. Anthenisdis—Armoraciæ comp.—Aurantii comp.—Calumbæ—Caryophylli—Coscarillæ—Cinchonæ—Caspariæ—Digitalis—Lini—Quassiæ—Simaroubæ—Tabaci.

INFU'SIVE. *a.* (from *infuse.*) Having the power of infusion, or being infused (*Thomson*).

INFUSO'RIA. In zoology, an order of the class vermes; consisting of minute, simple animalcules, seldom visible to the naked eye. See ZOOLOGY.

INGANNA'TION. *s.* (*ingannare*, Italian.) Cheat; fraud; deception; juggle; delusion; imposture: not in use (*Brown*).

I'NGATE. *s.* (*in* and *gate.*) Entrance; passage in (*Spenser*).

INGATESTONE, a town in Essex, with a market on Wednesdays. It is 23 miles N. E. of London.

INGA'THERING *s.* (*in* and *gathering.*) The act of getting in the harvest (*Exodus*).

INGE, in the names of places, signifies a meadow, from the Saxon ınᵹ (*Gibson*).

INGELSHEIM, a town of Germany, in the palatinate of the Rhine, remarkable for having long been the residence of the emperor; seated by the river Selva, on an eminence commanding a fine prospect. Lon. 8. 15. E. Lat. 49. 58. N.

To INGE'MINATE. *v. n.* (*ingemino*, Lat.) To double; to repeat (*Clarendon*).

INGEMINA'TION. *s.* (*in* and *geminatio*, Latin.) Repetition; reduplication.

INGE'NERABLE. *a.* (*in* and *generate.*)

Not to be produced or brought into being (*Boyle*).

INGE'NERATE. } *a.* (*ingeneratus*, La-
INGE'NERATED. } tin.) 1. Inborn; innate; inbred (*Wotton*). 2. Unbegotten. (*Bro.*)

INGE'NIOUS. *a.* (*ingeniosus*, Latin.) 1. Witty; inventive; possessed of genius. (*Sh.*) 2. Mental; intellectual: not in use. (*Shak.*)

INGE'NIOUSLY. *ad.* (from *ingenious.*) Wittily; subtilely (*Temple*).

INGE'NIOUSNESS. *s.* (from *ingenious.*) Wittiness; subtilty; strength of genius. (*Boy.*)

INGE'NITE. *a.* (*ingenitus*, Lat.) Innate; inborn; native; ingenerate (*South*).

INGENU'ITY. *s.* (from *ingenuous.*) 1. Openness; fairness; candour; freedom from dissimulation (*Wotton. Donne*). 2. (from *ingenious.*) Wit; invention; genius; subtilty; acuteness (*South*).

INGE'NUOUS. *a.* (*ingenuus*, Latin.) 1. Open; fair; candid; generous; noble. (*Loc.*) 2. Freeborn; not of servile extraction (*King Charles*).

INGE'NUOUSLY. *ad.* Openly; fairly; candidly; generously (*Dryden*).

INGE'NUOUSNESS. *s.* (from *ingenuous.*) Openness; fairness; candour.

I'NGENY. *s.* (*ingenium*, Latin.) Genius; wit: not in use (*Boyle*).

To INGE'ST. *v. a.* (*ingestus*, Latin.) To throw into the stomach (*Brown*).

INGE'STION. *s.* (from *ingest.*) The act of throwing into the stomach (*Harvey*).

INGLO'RIOUS. *a.* (*inglorius*, Lat.) Void of honour; mean; without glory (*Howel*).

INGLO'RIOUSLY. *ad.* With ignominy; with want of glory (*Pope*).

INGOLSTADT, a handsome town of Germany, in Bavaria, with a famous university, and a fine church. It is seated on the Danube. Lat. 48. 46. N. Lon. 11. 10. E.

INGOT, in the arts, is a small bar of metal made of a certain form and size, by casting it in hollowed iron or brass plates, called ingot moulds. The term is chiefly applied to the small bars of gold and silver, intended either for coining or exportation to foreign countries.

To INGRA'FF. *v. a.* (*in* and *graff.*) 1. To propagate trees by incision (*May*). 2. To plant the sprig of one tree in the stock of another. See Grafting. 3. To plant any thing not native (*Milton*). 4. To fix deep; to settle (*Hooker*).

INGRA'FTMENT. *s.* (from *ingraft.*) 1. The act of ingrafting. 2. The sprig ingrafted.

INGRANDE, a town of France, in the department of Mayne and Loire, seated on the Loire. Lat. 47. 23. N. Lon. 0. 25. W.

I'NGRATE. } *a.* (*ingratus*, Latin.) 1.
INGRA'TEFUL. } Ungrateful; unthankful. (*Shak.*) 2. Unpleasing to the sense. (*Bac.*)

To INGRA'TIATE. *v. a.* (*in* and *gratia*, Latin.) To put in favour; to recommend to kindness (*King Charles*).

INGRA'TITUDE. *s.* (*ingratitude*, French, *in* and *gratitude.*) Retribution of evil for good; unthankfulness (*Dryden*).

Ingratitude can neither be termed an affection, nor a disposition. It is the negative of a virtue, which a feeling heart places among the first of obligations. It is an insensibility to benefits received, either arising from stupidity, culpable inattention, or innate pride, that annihilates the idea of a favour, and considers every service rendered as the discharge of a debt. Out of the many instances of ingratitude which the pages of history present to our view, we select the two following:

1. Humphrey Bannister and his father were both servants to and raised by the Duke of Buckingham; who being driven to abscond, by an unfortunate accident befalling the army he had raised against the usurper Richard III. he without footman or page retired to Bannister's house, near Shrewsbury, as to a place where he had all the reason in the world to expect security. Bannister, however, upon the king's proclamation promising 1000l. reward to him that should apprehend the duke, betrayed his master to John Merton, high sheriff of Shropshire, who sent him under a strong guard to Salisbury, where the king then was, and there in the market-place the duke was beheaded. But divine vengeance pursued the traitor Bannister; for, demanding the 1000l. that was the price of his master's blood, King Richard refused to pay it him, saying, "He that would be false to so good a master ought not to be encouraged." He was afterwards hanged for manslaughter, his eldest son ran mad and died in a hog-sty, his second became deformed and lame, and his third son was drowned in a small puddle of water. His eldest daughter was got with child by one of his carters, and his second was seized with a leprosy whereof she died.—*Rapin's History of England*, 8vo. vol. I. p. 304.

2. Basilius Macedo the emperor, exercising himself in hunting, a sport he took great delight in, a great stag running furiously against him, fastened one of the branches of his horns in the emperor's girdle, and, pulling him from his horse, dragged him a good distance, to the imminent danger of his life; which a gentleman of his retinue perceiving, drew his sword and cut the emperor's girdle asunder, which disengaged him from the beast, with little or no hurt to his person. But observe what reward he had for his pains. "He was sentenced to lose his head for putting his sword so near the body of the emperor;" and suffered death accordingly.—*Zonor. Annal. tom.* 3. p. 155.

INGRE'DIENT. *s.* (*ingredient*, French; *ingrediens*, Latin.) Component part of a body, consisting of different materials (*Milton*).

I'NGRESS. *s.* (*ingressus*, Lat.) Entrance; power of entrance; intromission. (*Arbuth.*)

I'ngress, in astronomy, the sun's entering the first scruple of one of the four cardinal signs, and especially Aries.

I'NGRESSION. *s.* (*ingressio*, Latin.) The act of entering; entrance.

I'NGRIA, a province of the Russian empire, which now forms the government of St. Petersburgh. It is bounded on the north by the river Neva, and the gulph of Finland; on the east and south by the government of Novogorod, and on the west by that of Livonia. It is about 130 miles long, and 50 broad. The czar Peter the Great wrested it from the Swedes, and it was confirmed to him by the treaty of Nystadt in 1721. At this time, the inhabitants of the flat country were a Finnish people, but little different from the Fins of Carelia as to their language and manners. They were called Ischorki, and Ischortz, from the river Ischora, which runs into the Neva. Ingria did not retain its ancient Swedish privileges: on the contrary, Peter made a present of one part of the Ischortzi to certan Russian nobles; who, on their side, were obliged to people the less cultivated cantons of Ingria with colonies of Russians from their estates; and thence it is that we often see a village of Russians surrounded by villages of Fins. These Ischortzi have long followed agriculture. Their economy is an ill-chosen mean between that of the Russians and that of the Fins. They assemble in small villages, of five or ten farms each; and live miserably in small dirty huts. Their household furniture indicates the greatest penury; and their manner of living is squalid and disgusting. Notwithstanding the land that each family occupies is of tolerable extent, their agriculture and cattle are equally poor. Their inclination to idleness and drinking leads them often to sell their stock, and the very corn they have saved for sowing the fields. The money which that produces they squander in a short time, and are thus reduced to the most deplorable indigence.

I'NGUINAL. *a.* (*inguinal*, French; *inguen*, Latin.) Belonging to the groin (*Arbuthnot*).

To INGU'LF. *v. a.* (*in* and *gulf*.) 1. To swallow up in a vast profundity (*Milton*). 2. To cast into a gulf (*Hayward*).

INGU'LPHUS, abbot of Croyland, in the eleventh century, was in great favour with William the Conqueror. He rebuilt his monastery, and obtained for it many privileges. He died in 1109, aged 79. There is extant by him a history of Croyland Abbey, from 664 to 1091, published by Sir H. Saville in 1596, and at Oxford in 1684.

To INGU'RGITATE. *v. a.* (*ingurgito*, Lat.) To swallow down.

INGURGITA'TION. *s.* (from *ingurgitate*.) The act of swallowing.

INGU'STABLE. *a.* (*in* and *gusto*, Latin.) Not perceptible by the taste (*Brown*).

INHA'BILE. *a.* (*inhabilis*, Latin.) Unskilful; unready; unfit; unqualified.

To INHA'BIT. *v. a.* (*habito*, Latin.) To dwell in; to hold as a dweller (*Isaiah*).

To INHAB'IT. *v. n.* To dwell; to live (*Mil.*)

INHA'BITABLE. *a.* (from *inhabit*.) 1. Capable of affording habitation (*Locke*). 2. (*inhabitable*, French.) Incapable of inhabitants; uninhabitable: not in use. (*Shaks.*)

INHA'BITANCE. *s.* (from *inhabit*.) Residence of dwellers (*Carew*).

INHA'BITANT. *s.* (from *inhabit*.) Dweller; one that lives in a place (*Abbot*).

INHABITA'TION. *s.* (from *inhabit*.) 1. Abode; place of dwelling (*Milton*). 2. The act of inhabiting or planting with dwellings; state of being inhabited (*Raleigh*). 3. Quantity of inhabitants (*Brown*).

INHA'BITER. *s.* (from *inhabit*.) One that inhabits; a dweller (*Brown*).

To INHA'LE. *v. a.* (*inhalo*, Latin.) To draw in with air; to inspire (*Arbuthnot*).

INHA'LER, a machine used for steaming the lungs with the vapour of hot water, for the cure of a cough, cold, inflamed throat, &c.

INHARMO'NIOUS. *a.* (*in* and *harmonious*.) Unmusical; not sweet of sound (*Felton*).

To INHE'RE. *v. n.* (*inhæreo*, Latin.) To exist in something else (*Donne*).

INHE'RENT. *a.* (*inherent*, French; *inhærens*, Latin.) 1. Existing in something else, so as to be inseparable from it. (*Shaks.*) 2. Naturally conjoined; innate; inborn. (*Sw.*)

To INHE'RIT. *v. a.* (*enheriter*, French.) 1. To receive or possess by inheritance (*Addison*). 2. To possess; to obtain possession of (*Shakspeare*).

INHE'RITABLE. *a.* (from *inherit*.) Transmissible by inheritance; obtainable by succession (*Carew*).

INHE'RITANCE. *s.* (from *inherit*.) 1. Patrimony; hereditary possession (*Milton*). 2. The reception of possession by hereditary right (*Locke*). 3. Possession (*Shakspeare*).

INHE'RITANCE, in law, is a perpetuity in lands or tenements to a man and his heirs; and the word inheritance is not only intended where a man has lands or tenements by descent; but also every fee-simple, or fee-tail, which a person has by purchase, may be said to be an inheritance, because his heirs may inherit it (See DESCENT).

INHE'RITOR. *s.* (from *inherit*.) An heir; one who receives by succession (*Bacon*).

INHE'RITRESS. *s.* (from *inheritor*.) An heiress; a woman that inherits (*Bacon*).

INHE'RITRIX. *s.* (from *inheritor*.) An heiress (*Shakspeare*).

To INHE'RSE. *v. a.* (*in* and *herse*.) To enclose in a funeral monument (*Shakspeare*).

INHE'SION. *s.* (*inhæsio*, Latin.) Inherence; the state of existing in something else.

To INHI'BIT. *v. a.* (*inhibeo*, Latin; *inhiber*, French.) 1. To restrain; to hinder; to repress; to check (*Bentley*). 2. To prohibit; to forbid (*Clarendon*).

INHIBI'TION. *s.* (*inhibitio*, Latin.) 1. Prohibition; embargo (*Gov. of the Tongue*). 2. (in law) a writ to forbid a judge from further proceeding in the cause depending before him (*Cowell*).

To INHO'LD. *v. a.* (*in* and *hold*.) To have inherent; to contain in itself (*Raleigh*).

INHO'SPITABLE. *a.* (*in* and *hospitable.*) Affording no kindness or entertainment to strangers (*Dryden*).

INHO'SPITABLY. *ad.* (from *inhospitable.*) Unkindly to strangers (*Milton*).

INHO'SPITABLENESS. INHO'SPITALITY. } *s.* (*inhospitalité*, French.) Want of hospitality; want of courtesy to strangers.

INHU'MAN. *a.* (*inhumain*, French; *inhumanus*, Latin.) Barbarous; savage; cruel (*Atterbury*).

INHUMA'NITY. *s.* (*inhumanité*, French.) Cruelty; savageness; barbarity (*K. Charles*).

INHU'MANLY. *ad.* (from *inhuman.*) Savagely; cruelly; barbarously (*Swift*).

To I'NHUMATE. *To* INHU'ME. } *v. a.* (*inhumer*, French.) To bury; to inter (*Pope*).

INHU'MATION, in chemistry, a method of digesting substances by burying the vessel which contains them in horse-dung, or in dry sandy earth exposed to the sun.

To INJE'CT. *v. a.* (*injectus*, Latin.) 1. To throw in; to dart in (*Glanville*). 2. To throw up; to cast up (*Pope*).

INJE'CTION. *s.* (*injectio*, Latin.) The act of casting in (*Boyle*).

Inje'ction. (from *injicio*, *to cast* or *throw into*), any medicine made to be injected by a syringe, pipe, or other instrument, into any part of the body.

Injection, in anatomy, a mode by which anatomical subjects are preserved from decay, and their parts exhibited for the purposes of illustration. This art is no less worth cultivating amongst scientific veterinarians than amongst those of the medical profession, as it applies to the cure of human diseases. Injected preparations are either those of sound or of morbid parts. The former are of great use to the anatomical student, by showing the course of the arteries, veins, lymphatics, &c. in their natural state; and the latter are still more important, as they enable us to judge of the changes which different parts of an animal undergo in a state of disease, and thus direct us to the proper method of cure. In every view, indeed, the art of making anatomical preparations, by injection is of importance, and therefore we shall briefly avail ourselves, in this article, of such instructions as the best writers afford on the subject.

There are two modes of preserving anatomical subjects from putrefaction and the injuries of time, so as to exhibit the different parts of the animal body either in their natural or diseased state. These are either preserved in a dry or a wet state, *i. e.* immersed in ardent spirits.

Mr. Charles Bell, in his System of Dissections, gives the following useful directions on the mode of making anatomical preparations by injection:

"To those," says Mr. Bell, "who are commencing their operations, small subjects will be found the most convenient, being more easily managed, and not likely to embarrass the student with much confusion. Besides, his views at first should not be so immediately directed to practice; his object should rather be to acquire general ideas of the anatomy. Young subjects are likewise much fitter for injection (I mean for the injection of the arteries, and for minute injection): they are not only more easily heated and managed, but, what is of more consequence, their blood-vessels have an elasticity and strength which enables them to bear the push of the injection better, and, by a kind of elastic resistance, to give warning of the danger of rupturing their coats; while, in old bodies, the piston of the syringe goes easily down so far, stops, and, if forced, most probably bursts the vessels, driving the injection amongst the muscles, and giving much trouble in the dissection. When any of the trunks burst in this way, the tension being taken off, their coats contract upon the warm injection, and they remain half filled.

"In old age, this want of pliancy becomes very remarkable. There is often a kind of stiffness and rigidity, as if the coats of the vessels were corrugated."

If the mere course of the vessels be to be ascertained by course of injection, the sort employed or the means of using it is not of much consequence; but if the vessels be to be injected minutely, the subject should be first heated in warm water, or the application of steam to its surface. The vessels themselves should be heated at the same time, so that the matter of injection may not be chilled in its passage.

The common practice in injecting the great vessels, is to inject first, equal parts of white and brown spirit varnish, coloured with the same paint that is used for the coarse or wax injection; and this fine varnish injection, being moderately heated, and thrown in before the wax injection, clears its way, and moderately heats the vessels, so that they do not readily cool or retard the wax injection which is to follow. But, when using minute injection (which is size coloured with vermilion), for the purpose of demonstrating the minute vessels, although the hard injection is thrown into the vessels after it, simply to stop the regurgitation of the warm and liquid size, and to retain it in the minutest extremities of the vessels, yet it infallibly happens that the wax injection runs more minutely in this way than in any other. This being the case, it will be found, in all cases, to be a better method to use painters's size, coloured with vermilion, and heated, but not so much as to crisp the vessels; and to throw it in before the course of injection. It is the least expensive, runs more minutely, gives always a chance for beautiful specimens of minute injection, and can be pushed to any quantity, even till the skin of the limb becomes quite tense, without rupturing the vessels, or those vessels at least by which the coarse injection can escape. By this means the vessels are dilated, the limb made warm and moist, and the wax injection flows easily into the arteries, whilst the size escapes with the slightest pressure into the cellular texture.

"There are still other things," observes Mr. Bell, which require attention, viz. the tying of all collateral vessels that may have been opened, and the fixing of the tube securely in the mouth of the vessel. When the injecting pipe is introduced into the vessel, it cannot be retained there by a simple knot, without a chance of its slipping off during the injection, or, if tied firmly, of cutting the coats of the vessel. Therefore, after the ligature is drawn upon the artery including the tube, the ends of the ligature should be brought over the wings of the tube, and then carried round, so as to include that part of the ligature which reaches from the mouth of the tube to the wing; and being tied there, the former

knot is tightened, and the mouth of the artery drawn up upon the barrel of the tube.

" The coarse injection is composed of the following ingredients: bees' wax, six ounces; resin, eight ounces; turpentine varnish, six ounces. The wax and resin give hardness and consistency, and the varnish is added to give it pliancy. These colours are generally used: vermilion, king's yellow, flake white, smalt, verditer, verdigrease, lamp-black. They should be mixed with the turpentine varnish, and then added to the wax when melted; and, should there be occasion to melt the injection a second time, the heat must be cautiously applied, lest the colours should be burnt and destroyed. The injection should not be thrown into the vessels while too warm, for it will hurt their coats. The degree of heat should be such that the finger can be allowed to remain in it for a little while. A coarser composition can be made with tallow, wax, spirit of turpentine, and oil, coloured with the coarser paints; or, simply, tallow and red lead, when the parts are not to be preserved: and, for minute injection, turpentine, coloured with vermilion (which Haller preferred to all other injections for running minutely and without extravasation); painters' size, coloured with any of the above paints; or equal parts of brown and white spirit varnish.

" When delicate membranes are to be injected either with quicksilver or with fine size, instead of tying all the vessels by which the fluid may escape, I have found it necessary only to sear the hedges of the membrane with a heated iron; or, after having fixed the tubes. the common method is to dry the hedges all round, while the middle part is kept soft and moist. When it is required to demonstrate the vascularity of a part where there is no opportunity of injecting it, if membranous, the blood may be detained in the vessels by quickly drying and varnishing it. The blood, when extravasated, or when (as in the piles) preternaturally collected in vessels, may be coagulated by a solution of alum; or blood in inflamed parts may be coagulated by distilled vinegar. In other instances, or in preparations of the lacteals, their natural fluids may be coagulated and preserved by plunging them suddenly into strong spirits.

" There are many parts of the body which it is impossible to keep for any time in their original beauty, and these the most delicate and interesting; as the organs of the senses, and all minute nervous parts, the villi of the intestines, the comparative anatomy of insects, the incubated egg, &c. The ready demonstration of such delicate parts in the fresh subject is the truest test of the abilities of the practical anatomist; for there is more delicacy and nicety required in exposing these parts, and more real benefit to be derived from them, than in making the more lasting preparations. The minute structure of many of these parts must be dissected and unravelled under water, where the loose and floating membranes display themselves; while, out of the water, they would lie collapsed and undistinguished. In such investigations, I have found nothing of so much service as jelly made strong and quite transparent. When a delicate part is completely dissected (suppose it to be the coats of the eye), place it in the jelly as it is becoming firm, and hold out the parts, and they will be retained, elegantly displayed either for demonstration or for drawing."

M. Chaussier communicated to the Society of Medicine at Paris, a new method of preserving animal substances. After having enumerated the different methods employed for that purpose, he points out their defects and insufficiency. For preparing parchment, the skins are macerated in water, disengaging from them the unctuous particles, and dissolving likewise a part of the mucilage, so that nothing remains but the fibrous part. For tanning, the hides are put into lime-water, sulphuric acid, or into a solution of alkali, and afterwards exposed to the action of the tannin or tanning principle. For preserving the anatomical preparations, they are generally put into alkohol, which dries them up, and entirely changes their proper form; and though they are in this way preserved from putrefaction, yet they do not remain untouched by the insects. The carbonat of soda, and the sulphat of iron, which are also used for keeping off putrefaction from animal substances, render them soluble in water, by combining themselves with the unctuous particles, and forming a soap with them, whereby the size and form of the preparations are considerably altered. In order to avoid all these inconveniencies, M. Chaussier suffers the part intended for preservation to be macerated during a longer or shorter time, from three to eight or ten days, according to their respective size, in a solution of oxygenated muriat of mercury in distilled water. This liquor being always kept in a perfect state of saturation, by adding, from time to time, fresh muriat of mercury for that which is decomposed, imparts a great solidity to the parts impregnated with it, by giving consistency to the gelatinous parts, without changing their size and form; and, when exposed to the air for some time, they are secure from corruption and insects. It is through the medium of this mode of preparation that M. Chaussier has made several interesting observations on the structure of the brain, and particularly on the spinal marrow; for he discovered that this part, after being deprived of its pia mater, is composed of six very distinct bundles: further, that all the nerves which arise from this part of the brain are by no means simple productions of its fibres, but that they are inserted in it like hairs, by means of bulbs which adhere to the medulla by several small roots; and, when these nerves are pulled out, a double row of small regular holes will appear to the eye, into which the bulbs are implanted. A portion of brain, presented to the society by the inventor of this method, had the solidity of wood, without the least change in its natural size and form; another brain and spinal marrow, prepared in the same way, very distinctly showed the holes into which the nerves were ingrafted. The celebrated Ruysch made also use of a liquor and of injections to preserve his excellent anatomical preparations, by means of which he had succeeded in preserving the body of his own daughter in the colour of life and freshness of youth. This liquor, which he always kept as a mystery, seems to be the same with that of M. Chaussier, or at least something analogous. According to Ruysch, it likewise made the gelatin solid, and by degrees as hard as wood; the albuminous matter coagulated by it, and the crystalline lens put into it, became opake and white; the brain obtained in it a caseous and solid consistency. For colouring the injections, Chaussier advises to take madder or cinnabar; but never to make

them of wax, or any other unctuous matter, but of a mucilaginous solution, as the solution of ichthyocolla, or isinglass. After having injected the parts, he directs them to be put into a solution of oxygenated muriat of mercury, where the matter for injecting concretes, and becomes solid. For preserving whole bodies, it is necessary to make openings into the great cavities, head, chest, and belly, large enough for the liquor to penetrate into them; as, without this precaution, the intestines will not be secured from corruption. Ruysch himself always made such incisions for the above purpose.

In *Anatomy* great improvement has been made by means of injections. Ruysch was the first who was eminent in their use. Rieger published Ruysch's method. The properties required in the injecting matter are, first, fluidity; but this alone is not sufficient: they must likewise, secondly, grow stiff when cold, yet not so stiff but that they may remain tough and flexible; for, were they too hard, the smaller vessels would always be in danger of being broken.

INI'MICAL. *a.* (*inimicus*, Lat.) Unfriendly; unkind; hurtful; hostile; adverse.

INIMITABI'LITY. *s.* (from *inimitable.*) Incapacity to be imitated (*Norris*).

INI'MITABLE. *a.* (*inimitabilis*, Latin.) Above imitation; not to be copied (*Denham*).

INI'MITABLY. *ad.* (from *inimitable.*) In a manner not to be imitated; to a degree of excellence above imitation (*Pope*).

To INJO'IN. *v. a.* (*enjoindre*, French; *injungo*, Latin.) 1. To command; to inforce by authority. See Enjoin (*Hooker*). 2. To join: not used (*Shakspeare*).

INI'QUITOUS. *a.* (*inique*, French from *iniquity.*) Unjust; wicked.

INI'QUITY. *s.* (*iniquitas*, Latin, *iniquité*, French.) 1. Injustice; unrighteousness (*Smalridge*). 2. Wickedness; crime (*Hooker*).

INI'TIAL. *a.* (*initial*, French; *initialis*, Lat.) 1. Placed at the beginning (*Pope*). 2. Incipient; not complete (*Harvey*).

To INI'TIATE. *v. a.* (*initier*, French; *initio*, Latin.) To enter; to instruct in the rudiments of an art; to place in a new state; to put into a new society (*More*).

To Initiate. *v. n.* To do the first part; to perform the first rite (*Pope*).

Initiate. *a.* (*initié*, Fr. *initiatus*, Latin.) Unpractised (*Shakspeare*).

INITIA'TION. *s.* (*initio*, Latin.) The reception, admittance, or entrance of a new comer to any art or state (*Hammons*).

INJUCU'NDITY. *s.* (*in* and *jucundity.*) Unpleasantness.

INJU'DICABLE. *a.* (*in* and *judico*, Latin.) Not cognizable by a judge.

INJU'DICIAL. *a.* (*in* and *judicial.*) Not according to form of law.

INJUDI'CIOUS. *a.* (*in* and *judicious.*) Void of judgment; wanting judgment (*Tillotson*).

INJUDI'CIOUSLY. *ad.* With ill judgment; not wisely (*Broome*).

INJU'NCTION. *s.* (from *enjoin*; *injunctus*, *injunctio*, Lat.) Command; order; precept (*Shaks.*)

Inju'nction, in law, is a prohibitory writ, restraining a person from committing or doing a thing which appears to be against equity and conscience. An injunction is usually granted for the purpose of preserving property in dispute pending a suit; as to restrain the defendant from proceedings at the common law against the plaintiff, or from committing waste, or doing any injurious act. Injunctions issue out of the courts of equity in several instances: the most usual injunction is to stay proceedings at law, as if one bring an action at law against another, and a bill be brought to be relieved either against a penalty or to stay proceedings at law, on some equitable circumstances, of which the party cannot have the benefit at law. In such case the plaintiff in equity may move for an injunction either upon an attachment, or praying a dedimus, or praying a farther time to answer; for it being suggested in the bill that the suit is against conscience, if the defendant be in contempt for not answering, or pray time to answer, it is contrary to conscience to proceed at law in the mean time, and therefore an injunction is granted of course, but this injunction only stays execution touching the matter in question, and there is always a clause giving liberty to call for a plea to proceed to trial, and for want of it to obtain judgment; but execution is stayed till answer, or farther order. The methods of dissolving injunctions are various.

To I'NJURE. *v. a.* (*injurier*, French.) 1. To hurt unjustly; to mischief undeservedly; to wrong (*Temple*). 2. To annoy; to affect with any inconvenience (*Milton*).

I'NJURER. *s.* (from *injure.*) He that hurts another unjustly (*Ben Jonson*).

INJU'RIOUS. *a.* (*injurius*, Latin.) 1. Unjust; invasive of another's rights (*Shaks.*) 2. Guilty of wrong or injury (*Milton*). 3. Mischievous; unjustly hurtful (*Tillotson*). 4. Detractory; contumelious; reproachful; wrongful (*Swift*).

INJU'RIOUSLY. *ad.* Wrongfully; hurtfully; with injustice; with contumely (*Pope*).

INJU'RIOUSNESS. *s.* (from *injurious.*) Quality of being injurious (*K. Charles*).

I'NJURY. *s.* (*injuria*, Latin.) 1. Hurt without justice (*Haywood*). 2. Mischief; detriment (*Watts*). 3. Annoyance (*Mortimer*). 4. Contumelious language; reproachful appellation: not in use (*Bacon*).

INJU'STICE. *s.* (*injustice*, Fr.; *injustitia*, Latin.) Iniquity; wrong (*Swift*).

INK, a black fluid employed in writing, and printing, and usually prepared with an infusion of galls, copperas, and gum-arabic.

The chief requisites for the making of good writing ink, are, 1. Limpidity, so that it may flow freely from the pen. 2. A deep uniform and black colour. 3. Durability, so that the letters be not liable to be effaced by age; and 4. It should be divested of any corrosive quality, by which the substance of the paper may be destroyed, or the writing rendered in any degree illegible. No ink, however, hitherto used, possesses all these

properties; hence several ingenious chemists have been induced to make experiments, in order to render it more perfect.

M. Ribaucourt, in the "Annales de Chimie," directs eight ounces of Aleppo galls, and four ounces of logwood, to be boiled in twelve pounds of water, till the quantity is reduced to one half; when the liquor should be strained through a linen or hair sieve into a proper vessel. Four ounces of sulphate of iron (green vitriol); three ounces of gum-arabic; one ounce of sulphate of copper (blue vitriol); and a similar quantity of sugar-candy, are now to be added: the liquid should be frequently shaken, to facilitate the solution of the salts. As soon as these ingredients are perfectly dissolved, the composition is suffered to subside for twenty-four hours; when the ink may be decanted from the gross sediment, and preserved for use in glass or stone bottles, well stopped.

This ink exhibits a purplish-black colour in the bottles; but the writing performed with it, is said to be of a beautiful black cast, which it retains, unaltered, for a considerable length of time. Each quart of the preparation contains:

	oz.	*drs.*	*grs.*
Of galls - - - - -	2	5	20
Green vitriol - -	1	2	40
Logwood - - -	1	2	40
Gum - - - - -	1	0	0
Blue vitriol - -	0	2	40
Sugar-candy - -	0	2	40

M. Ribaucourt is of opinion, that ink thus prepared, may be preserved several years in a state of perfection, without depositing either galls or iron.

The ink commonly used, is manufactured by stationers, according to Dr. Lewis's recipe; but it is ill calculated for keeping, as it deposits a black sediment, while the fluid itself is of a pale colour. Each quart of this ink contains:

	oz.	*drs.*	*grs.*
Of galls - - - - -	3	0	0
Green vitriol - -	1	0	0
Logwood - - -	0	5	24
Gum - - - - -	1	0	0

Neither blue vitriol nor sugar are employed in this preparation. As, however, both the ink made after the latter method, and that compounded according to other recipes, are not adapted to resist the effects of acids, and are consequently by no means fit for records, deeds, and other documents, M. Westrumb recommends the following ingredients, as being well calculated to remedy this inconvenience. He directs one ounce of Brazil-wood, and a similar quantity of gall-nuts, to be boiled in forty-six ounces (somewhat less than three pints) of water, till the whole be reduced to thirty-two ounces, or about two quarts.

This decoction is to be poured, while hot, upon half an ounce of copperas, or green vitriol; a quarter of an ounce of gum-arabic, and a similar quantity of white sugar. As soon as a perfect solution of these substances has taken place, one ounce and a quarter of indigo finely pulverized is to be added; together with three quarters of an ounce of the purest lamp-black, previously diluted in one ounce of the best brandy. The whole is to be well incorporated; and, after it has subsided, M. Westrumb asserts that it will form an ink absolutely indestructible by acids.

A more simple composition, is that proposed by M. Bosse, who directs one ounce of Brazil-wood to be boiled in twelve ounces of water with half an ounce of alum, till the liquid be reduced to eight ounces; when one ounce of calcined manganese is to be mixed with half an ounce of gum-arabic, and added to the liquor, which should be previously decanted, in order to render it perfectly limpid. This preparation is said to possess the property of being indelible by the use of any kind of acid, and to be superior to that proposed by M. Westrumb.

A durable ink may also be prepared by washing paper, parchment, &c. with the Prussic acid, which will not in the least injure either of these substances. The materials, thus prepared, may be written on with common ink, and a ground of Prussian blue will be formed beneath every stroke, which will remain long after the black has decayed by the influence of the air, or been destroyed by acids.

The latest, and perhaps most simple, preparation of black ink, is that contrived by Van Mons, who observed that sulphate of iron, or green vitriol, when calcined till it became white, uniformly afforded a very beautiful black precipitate. According to his experiments, the following ingredients produced an excellent writing ink: four ounces of galls, two ounces and a half of calcined vitriol of iron perfectly white, and two pints of water. The whole was infused in a cold place for twenty-four hours; adding ten drams of pulverized gum-arabic, and preserving it in a glass bottle, or glazed earthen vessel, slightly covered with paper.

Van Mons has applied the discoveries of Proust to the preparation of common writing ink. He has found that the sulphet of iron calcined to whiteness, always gives a most beautiful black precipitate. By the following mixture, he obtained excellent ink: galls 4 oz.; sulphat of iron, calcined to whiteness, 2½ oz.; and two pints of water. The whole must be left to mascerate cold for 24 hours; then add gum-arabic 10 drams, and preserve it in a stone jar open, or covered merely with paper. Chaptal has also employed the calcined sulphat, in connection with the decoction of gall-nuts and logwood.

M. Desormeaux, Junr. of Vine-court, Spitalfields, who has long been in the habit of preparing ink upon a large scale, has communicated to the Philosophical Magazine, a valuable paper on the subject, from which the following directions are extracted. In six quarts, beer measure of water (it does not appear of importance whether it be rain, river, or spring water) boil four ounces of the best Campeachy logwood, chipped very thin across the grain (the boiling may be continued near an hour); adding from time to time a little boiling water, to compensate for waste by evaporation. Strain the liquor, while hot; suffer it to cool, and make up the quantity equal to five quarts, by the further addition of cold water. To this cold decoction put one pound averdupois weight of blue galls, or 20 oz. of the best galls in sorts, which should be first coarsely bruised; 4 oz. of sulphat of iron, calcined to whiteness; ½ oz. of the acetite of copper, which should be triturated in a mortar, moistened by a little of the decoction gradually added till it be brought to the form of a smooth paste, and then thoroughly intermixed with the whole mass. Three ounces of coarse brown sugar, and six ounces of good gum Senegal, or Arabic, are also to be added. These several ingredients may be introduced one after the other immediately, contrary to the advice of some, who recommend the gum, &c. to be added

when the ink is nearly made; as gum, however, is at present exorbitantly dear, three or four ounces will be found sufficient, with only one and a half ounce of sugar, unless, for particular purposes, it is wanted to bear a higher gloss than common. As the common writing inks are delible by many of the acids, especially the oxymuriatic, several chemists and others, particularly M. Pitel of Minden, Dr. Lentin, Wiegleb, Westrumb, Thorey, M. Bosse, of Hamburgh, have endeavoured to discover a composition which would resist the action of this acid, and most of them have succeeded in the attempt. The two following methods are given by Bosse. 1. Boil 1 oz. of brazil-wood with 12 ozs. of water for a quarter of an hour, add ½ oz. of alum: evaporate the whole to 8 ozs., and mix with the liquor 1 oz. of exceedingly soft finely pulverised manganese, mixed up with ½ oz. of pulverised gum-arabic; or 2. Boil 4 oz. of Brazil wood, and 3 ozs. of coarsely pulverised galls, with 9 ozs. of vinegar and as much water, for the space of eight minutes: in the liquor after being strained, dissolve 1½ oz. of sulphat of iron, and 1 oz. of gum-arabic, and then add to the whole a solution of ½ oz. of indigo in 1 oz. of concentrated sulphuric acid. M. Bosse also prepared an ink from the principal ingredients of common ink, but, instead of the usual liquids, he employed the expressed juice of some plant; those which he found most efficacious were obtained from the leaves of the caper spurge, *Euphorbia Lathyris Linn*, the common holly, *Sambucus Niger*, and common grass, P. M. V. 357.

INK *Powder*. Common liquid ink, the method of making which we have already described, is not easily transported from one place to another; and, besides this inconvenience, it is apt to dry in the ink-holder. In bottles, unless well corked, it becomes decomposed and evaporates; and if the bottles happen to break, it may spoil clothes, or any other articles near it. For the convenience therefore of those who travel either by land or by sea, ink powder has been invented, which is nothing else than the substances employed in the composition of common ink, pounded and pulverised; so that it can be converted into ink in a moment, by mixing it up with a little water.

CHINA or INDIAN INK, which is employed for small drawings and plans, may easily be made by the following process. Take the kernels of the stones of apricots, and burn them in such a manner as to reduce them to powder, but without producing flame; which may be done by wrapping up a small packet of them in a cabbage-leaf, and tying round it a bit of iron wire. Put this packet into an oven, heated to the same degree as that required for baking bread, and the kernels will be reduced to a sort of charcoal with which an ink may be made similar to that brought from China.

Pound this charcoal in a mortar, and reduce it to an impalpable powder, which must be sifted through a fine sieve, then form a pretty thick solution of gum-arabic in water, and, having mixed it with the powder, grind the whole on a stone, in the same manner as colour-men grind their colours. Nothing is then necessary, but to put the paste into some small moulds, formed of cards, and rubbed over with white wax, to prevent it from adhering to them.

In regard to the smell of the China ink, it arises from a little musk, which the Chinese add to the gum-water, and may easily be imitated. The figures seen on the sticks of China ink, are the particular marks of the manufacturers, who, as in all other countries, are desirous of distinguishing whatever comes from their hands.

Dr. Lewis thinks, from the information of Father du Halde, that China ink is composed of nothing but lamp-black and animal glue. Having boiled a stick of China ink in several portions of water, in order to extract all the soluble parts, and having filtered the different liquors, which he evaporated in a stone vessel, he found that the liquors had the same odour as glue, and that they left, after evaporation, a pretty considerable quantity of a tenaceous substance, which seemed to differ in nothing from common glue.

INKS, *coloured*. Few of these are used except red ink. The preparation of these is very simple, consisting either of decoctions of the different colouring or dying materials in water, and thickened with gum-arabic, or of coloured metallic oxides or insoluble powders, merely diffused in gum-water. The proportion of gum-arabic to be used may be the same as for black writing ink. All that applies to the fixed or fugitive nature of the several articles used in dying, may be applied in general to the use of the same substances as inks.

INK, *red*, is usually made by boiling about two ounces of Brazil wood in a pint of water, for a quarter of an hour, and adding to the decoction the requisite quantity of gum, and about half as much alum. The alum both heightens the colour and makes it less fugitive. Probably a little madder would make it more durable.

INK, *blue*, may be made by diffusing Prussian blue or indigo through strong gum-water.

INK, *yellow*, may be made by a solution of gam boge in gum-water.

Most of the common water-colour cakes diffused in water, will make sufficiently good coloured inks for most purposes.

Inks of other colours may be made from a strong decoction of the ingredients used in dying, mixed with a little alum and gum-arabic. For example, a strong decoction of Brazil wood, with as much alum as it can dissolve, and a little gum, forms a good red ink. These processes consist in forming a lake, and retarding its precipitation by the gum. See LAKE.

On many occasions it is of importance to employ an ink indestructible by any process, that will not equally destroy the material on which it is applied. Mr. Close has recommended for this purpose 25 grains of copal in powder dissolved in 200 grains of oil of lavender, by the assistance of gentle heat, and then mixed with 2½ grains of lamp black and half a grain of indigo: or 120 grains of oil of lavender, 17 grains of copal, and 60 grains of vermilion. A little oil of lavender, or of turpentine, may be added, if the ink be found too thick. Mr. Sheldrake suggests, that a mixture of genuine asphaltum dissolved in oil of turpentine, amber, varnish, and lamp black, would be still superior.

When writing with common ink has been effaced by means of oxygenized muriatic acid, the vapour of sulphuret of ammonia, or immersion impregnated with this sulphuret, will render it again legible. Or if the paper that contained the writing be put into a weak solution of prussiate of potash, and when it is thoroughly wet a sulphuric acid be added to the liquor, so as to render it slightly acidulous, the same purpose will be answered.

Ink, *Golden*. As writing, before the invention of printing, was the only method of transmitting to posterity the works and discoveries of celebrated men, it became in the fourteenth and fifteenth centuries an art much cultivated, and in which many persons excelled. The manuscripts of those periods contain writing, the neatness and regularity of which are astonishing. Transcribers were even acquainted with a method of ornamenting the initial letters with gold, which they applied in such a manner as to preserve all its splendour. Writing, by the invention of printing, having become of less importance, soon degenerated, and the secret of applying gold to paper and parchment, like many other arts, was at length lost. The Benedictines however re-discovered this secret, and specimens of the process, and parchment containing writing in gold letters, as brilliant as those so much admired in the ancient manuscripts, have been seen at the Abbey Saint-Germain-des-Pres at Paris. This process may be exceedingly useful, and may furnish hints for improving some of the other arts, which are all connected, and mutually tend to promote each other. See Illuminating.

Ink, *printer's*. This is a very singular composition, partaking much of the nature of an oil varnish, but differing from it in the quality of adhering firmly to moistened paper, and in being to a considerable degree soluble in soap-water.

It is, when used by the printers, of the consistence of rather thin jelly, so that it may be smeared over the types readily and thinly, when applied by leather cushions, and it dries very speedily on the paper without running through to the other side, or passing the limits of the letter.

The method of making printer's ink is thus described by Dr. Lewis. Ten or twelve gallons of nut-oil are set over the fire in a large iron pot, and brought to boil. It is then stirred with an iron ladle, and whilst boiling, the inflammable vapour rising from it either takes fire of itself or is kindled, and suffered to burn in this way for about half an hour, the pot being partially covered so as to regulate the body of the flame, and consequently the heat communicated to the oil. It is frequently stirred during this time, that the whole may be heated equally, otherwise a part would be charred and the rest left imperfect. The flame is then extinguished by entirely covering the pot. The oil by this process has much of its unctuous quality destroyed, and when cold is of the consistence of soft turpentine, and is then called varnish. After this it is made into ink by mixture with the requisite quantity of lamp-black, of which about two ounces and a half are sufficient for sixteen ounces of the prepared oil. The oil loses by the boiling about an eighth of its weight, and emits very offensive fumes. Several other additions are made to the oil during the boiling, such as crusts of bread, onions, and sometimes turpentine. These are kept secret by the preparers. The intention of them is more effectually to destroy part of the unctuous quality of oil, to give it more body; to enable it to adhere better to the wetted paper, and to spread on the types neatly and uniformly.

Besides these additions, others are made by the printers, of which the most important is generally understood to be a little fine indigo in powder, to improve the beauty of the colour.

Red printer's ink, is made by adding to the varnish, about half its weight of vermilion. A little carmine also improves the colour. (Encyc. Arts et Metiers, vol. iii. p. 518).

Ink, Sympathetic, a liquor employed for writing on paper, so that it may retain its natural whiteness after the letters are formed, till it is held near the fire, rubbed with another liquor, or some other expedient is used to render the characters legible.

Sympathetic inks are prepared from various substances, such as bismuth, lead, &c. Thus, a solution of common sugar of lead in water, if employed with a clean pen, will remain concealed till it is wetted with a solution of the liver of sulphur, or is exposed to the vapours of such liquid; in which case it will assume a deeper or lighter brown shade, in proportion to the strength of the sulphureous gas. By the same process, words written with a solution of bismuth in spirit of nitre, will appear of a deep black colour.

Another sympathetic ink may be easily prepared, by diluting oil of vitriol with a sufficient quanty of water, to prevent the paper from being corroded. Letters drawn with this fluid are invisible when dry, but, on being held near the fire, they assume a perfect black colour. The juices of lemons, or onions; a solution of sal ammoniac, &c. will answer a similar purpose, though their application is more difficult, and they afterwards require a greater degree of heat.

Ink, *removing the stains of*. The stains of ink on cloth, paper or wood, may be removed by almost all acids; but those acids are to be preferred which are least likely to injure the texture of the stained substance. The muriatic acid, diluted with five or six times its weight of water, may be applied to the spot, and, after a minute or two, may be washed off, repeating the application as often as may be found necessary. But the vegetable acids are attended with less risk, and are equally effectual. A solution of the oxalic, citric (acid of lemons), or tartareous acids, in water, may be applied to the most delicate fabrics without any danger of injuring them; and the same solutions will discharge writing, but not printing-ink. Hence they may be employed in cleaning books which have been defaced by writing on the margin, without impairing the text. Lemon-juice, and the juice of sorrel, will also remove ink-stains, but not so easily as the concrete acids of lemons, or citric acid.

Ink *for marking Linen*. M. Haussman has given some compositions for marking pieces of cotton or linen, previous to their being bleached, which are capable of resisting every operation in the processes both of bleaching and dying, and consequently might be employed in marking linen for domestic purposes. One of these consists of asphaltum dissolved in about four parts of oil of turpentine, and with this is to be mixed lamp black, or black lead in fine powder, so as to make an ink of a proper consistence, for printing with types. Another, the blackish sulphate left after expelling oxygen gas from oxide of manganese with a moderate heat being dissolved and filtered, the dark grey pasty oxide left on the filter is to be mixed with a very little solution of gum tragacanth, and the cloth marked with this is to be dipped in a solution of potash or soda, mild or caustic, in about ten parts of water.

An ingenious correspondent, Mr. J. S. Gaskoin, has favoured us with the following receipt for the composition of the "Chemical Indelible Ink," sold for the purpose of marking linen. The linen, that the black colour may be produced and fixt, is first

moistened with a mordant, which is a solution of soda, made thus: take of prepared soda 4 drams, distilled or common soft water 1 ounce, saffron 1 grain, gum-arabic 15 grs. The constituents of the ink are, lunar caustic 1 scruple, distilled water 1½ dram; or, if common soft water be used two drops of nitrous acid should be added to the solution. The mordant with which the linen has been moistened being suffered perfectly to dry by a gentle heat, the part where the linen has been moistened is written upon with a clean pen dipped in the ink.

Ink *for the Rolling Press* is made of linseed oil burnt in the same manner as that for common printing ink, and then mixed with Francfort black, and finely ground. There are no certain proportions which can be determined in this kind of ink; every workman adding oil or black to his ink as he thinks proper, in order to make it suit his purpose. Some, however, mix a portion of common boiled oil which has never been burnt: but this must necessarily be a bad practice, as such oil is apt to go through the paper; a fault very common in prints, especially if the paper is not very thick. No soap is added; because the ink is not cleared off from the copper-plates with alkaline ley as in common printing, but with a brush dipped in oil.

To INK. *v. a.* (from the noun,) To black or daub with ink.

INKHO'RN. *s.* (*ink* and *horn.*) A portable case for the instruments of writing, commonly made of horn (*Shakspeare*).

I'NKLE. *s.* A kind of narrow fillet; a tape. (*Gay*).

I'NKLING. *s.* Hint; whisper; intimation. (*Clarendon*).

I'NKMAKER. *s.* (*ink* and *maker.*) He who makes ink.

I'NKY. *a.* (from *ink.*) 1. Consisting of ink (*Shakspeare*). 2. Resembling ink (*Boyle*). 3. Black as ink (*Shakspeare*).

I'NLAND. *a.* (*in* and *land.*) Interior; lying remote from the sea (*Swift*).

I'nland. *s.* Interiour or midland parts. (*Shakspeare*).

I'NLANDER. *s.* (from *inland.*) Dweller remote from the sea (*Brown*).

I'NLAND *Navigation.* See Canal.

To INLA'PIDATE. *v. a.* (*in* and *lapido*, Lat.) To make stony; to turn to stone (*Bacon*).

To INLA'Y. *v. a.* (*in* and *lay.*) 1. To diversify with different bodies inserted into the ground or subtratum (*Gay*). 2. To make variety by being inserted into bodies; to variegate (*Milton*).

INLA'Y. *s.* (from the verb.) Matter inlaid; matter cut to be inlaid (*Milton*).

To INLA'W. *v. a.* (*in* and *law.*) To clear of outlawry or attainder (*Bacon*).

I'NLET. *s.* (*in* and *let.*) Passage; place of ingress; entrance (*Wotton*).

I'NLY. *a.* (from *in* and *ly.*) Interiour; internal; secret (*Shakspeare*).

I'nly. *ad.* Internally; within; secretly; in the heart (*Milton. Dryden*).

I'NMATES, such persons as are admitted, for their money, to live in the same house or cottage with another man, in different rooms, but going in at the same door; being usually supposed to be poor, and not able to maintain a whole house themselves. These are inquirable in a court-leet. No owner or occupier of a cottage shall suffer any inmates therein, or more families than one to habit there, on pain of forfeiting 10*s.* per month to the lord of the leet.

I'NMOST. *a.* (from *in.*) Deepest within; remotest from the surface (*Shakspeare*).

INN. *s.* (inn, Saxon, a chamber.) A house of entertainment for travellers.

The inns of this country are under admirable regulations, which, if properly enforced, would prevent many iniquitous practices carried on by inn-keepers. These persons are licensed by justices of the peace, and are obliged to enter into recognizances for the maintenance of good order. Thus, if an inn-keeper refuse to receive a traveller into his house as a guest, or to furnish him with necessaries, on his offering a reasonable price, the former is liable to an action for damages, and may be indicted at the king's suit.

In case any inn-holder refuse to sell his hay, oats, &c. he is liable to fine and imprisonment, by the 21 Jac. I. c. 21. And if any guest lose property in such a house, an action may be brought against the keeper of the inn for its recovery, or the adequate value.

There are various other regulations which are equally advantageous to the landlord, who is justified in seizing the horse, or other article belonging to his guest, for the reckoning, till the debt is paid. And if a person leave his horse in the stable of an inn, the keeper may detain it till the owner pay the expense occasioned by feeding it: should the animal, however, consume as much provender as is equal to his value, upon a fair appraisement, the landlord is empowered to sell it, and reimburse himself.

Inns, a name by which our colleges of municipal or common law professors and students are called: the old English word for houses of noblemen, bishops, and others of extraordinary note, being of the same signification with the French word *hotel.*

Inns of Court are so called, as some think, because the students there are to serve and attend the courts of judicature; or else, because anciently these colleges received none but the sons of noblemen and better sort of gentlemen, who were here to be qualified to serve the king in his court, as Fortesque affirms. And, in his time, he says, there were about 2000 students in the inns of court and chancery, all of whom were *filii mobilium*, or gentlemen born. But this custom has gradually fallen into disuse; so that in the reign of queen Elizabeth, Sir Edward Coke does not reckon above 1000 students, and the number at present is very considerably less.

Our inns of court, justly famed for the production of men of learning in the law,

are governed by masters, principals, benchers, stewards, and other officers; and have public halls for exercises, readings, &c. which the students formerly used to attend and perform for a certain number of years, before they could be admitted to plead at the bar. These societies have not, however, any judicial authority over their members; but instead of this, they have certain orders among themselves, which have by consent the force of laws. For lighter offences persons are only excommoned, or put out of commons; for greater, they lose their chambers, and are expelled the college; and when once expelled out of one society, they are never received by any of the others. The gentlemen in these societies may be divided into benchers, outer barristers, inner-barristers, and students.

The four principal inns of court, are the Inner Temple and Middle Temple, heretofore the dwelling of the Knights Templars, purchased by some professors of the common law about 300 years ago; Lincoln's Inn, and Gray's Inn, anciently belonging to the earls of Lincoln and Gray. The other inns are the two Serjeants Inns.

Inns of Chancery were probably so called, because anciently inhabited by such clerks as chiefly studied the forming of writs, which regularly belonged to the cursitors, who are officers of chancery. The first of these was Thavie's Inn, begun in the reign of Edward III. and afterwards sold to the society of Lincoln's Inn. Besides this, we have New Inn, Symond's Inn, Clement's Inn, Clifford's Inn, anciently the house of the Lord Clifford; Staple Inn, belonging to the merchants of the staple; Lion's Inn, anciently a common inn with the sign of the lion; Furnival's Inn, and Bernard's Inn. These were heretofore preparatory colleges for younger students; and many were entered here before they were admitted into the inns of court. Now they are mostly taken up by attorneys, solicitors, &c.

Inn, a river of Germany, which has its source in the country of the Grisons, at the foot of the mountain Septimerberg; it runs a N.E. course, and falls into the Danube between Passau and Instadt.

To Inn. *v. n.* (from the noun.) To take up temporary lodging (*Donne*).

To Inn. *v. a.* To house; to put under cover (*Shakspeare*).

INNA'TE. } *a.* (*inné*, Fr. *innatus*, Lat.)
INNA'TED. } Inborn; ingenerate; natural; not superadded; not adscititious (*Howel*).

INNA'TENESS. *s.* (from *innate.*) The quality of being innate.

INNA'VIGABLE. *a.* (*innavigabilis*, Latin.) Not to be passed by sailing (*Dryden*).

I'NNER. *a.* (from *in.*) Interiour; not outward (*Spenser*).

I'NNERMOST. *a.* (from *inner.*) Remotest from the outward part (*Newton*).

INNHO'LDER. *s.* (*in* and *hold.*) A man who keeps an inn; an innkeeper.

INNICHEN, a town of Germany, in the Tyrol, situate on the Drave. Lat. 46. 48. N. Lon. 12. 17. E.

I'NNINGS. *s.* Lands recovered from the sea (*Ainsworth*).

I'nnings, at the game of cricket. See Cricket.

INNISFAIL, derived from *Inis Bheal*, that is, "the island of Bheal," one of the ancient names of Ireland, so denominated from *Beal*, the principal object of adoration among the ancient inhabitants of the British Isles.

INNISFALLEN, an island in the lake of Killarney, in the county of Kerry, and province of Munster. It contains about 12 acres, is agreeably wooded, and has a number of fruit trees. In it are the ruins of a very ancient religious house, founded by St. Finian, the patron saint of those parts, and to him the cathedral of Aghadoe is also dedicated. This St. Finian flourished about the middle of the 6th century; he was surnamed in Irish *Labbar;* his father's name was *Conail* the son of *Eschod*, descended from *Kian* the son of *Alild*, king of Munster. There was a chronicle kept in this abbey, which is frequently cited by Sir J. Ware, and other antiquaries, under the title of *Annals of Innisfallen.*

INNISHANNON, a town in the county of Cork, and province of Munster, 134 miles from Dublin. It is situated on the river Bandon, six miles from Kinsale.

INNISHIRKAN, an island situated between Cape Clear Island and Baltimore Bay, in the county of Cork, and province of Munster. In this island stood the castle of Dunelong, possessed by the O'Driscolls, which was surrendered after the defeat of the Spaniards to Captain Hervey, on the 23d Feb. 1602. There was afterwards a regular fortification erected on part of the island, which was garrisoned in queen Ann's time, but it has been for several years dismantled: about a mile to the south are the remains of an ancient abbey, founded 1460, for Franciscans, by Florence O'Driscoll. This island has very good land, and is vastly preferable to that of Cape Clear islands.

INNISKILLING, a town of Ireland, in the county of Fermanagh, with a strong fort, it being a pass of the greatest importance from the N. to the S. of Ireland. It is seated on an island in the middle of Lough Earne. Lat. 54. 25. N. Lon. 6. 50. W.

INNISLOCHRAN, or the *Stoney Island*, an island of Lough Ree, in the river Shannon, between the counties of Westmeath and Roscommon.

INNKE'EPER. *s.* (*inn* and *keeper.*) One who keeps lodgings and provisions for entertainment of travellers (*Taylor*).

I'NNOCENCE. } *s.* (*innocentia*, Latin.) 1.
I'NNOCENCY. } Purity from injurious

actions; untainted integrity (*Tillotson*). 2. Freedom from guilt imputed (*Shakspeare*). 3. Harmlessness; innoxiousness (*Burnet*). 4. Simplicity of heart, perhaps with some degree of weakness (*Shakspeare*).

I'NNOCENT. *a.* (*innocens*, Latin.) 1. Pure from mischief (*Milton*). 2. Free from any particular guilt (*Dryden*). 3. Unhurtful; harmless in effects (*Pope*).

I'NNOCENT. *s.* One free from guilt or harm (*Spenser*). 2. A natural; an idiot (*Hooker*).

I'NNOCENTLY. *ad.* 1. Without guilt. 2. With simplicity; with silliness or imprudence. 3. Without hurt (*Cowley*).

INNOCENT's DAY, a festival held by several Christian churches on December 28, in memory of the massacre of the innocent children by command of Herod, king of Judea.

INNO'CUOUS. *a.* (*innocuus*, Lat.) Harmless in effects (*Grew*).

INNO'CUOUSLY. *ad.* Without mischievous effect (*Brown*).

INNO'CUOUSNESS. *s.* Harmlessness. (*Dig.*)

INNOMINATA ARTERIA. The first branch given off by the arch of the aorta. It soon divides into the right carotid and right subclavian arteries.

INNOMINATUM OS, (*Innominatus*, from *in*, priv. and *nomen*, a name; so called because the three bones of which it originally was formed grew together, and formed one complete bone, which was then left nameless.) A large irregular bone, situated at the side of the pelvis. It is divided into three portions, viz. the iliac, ischiatic, and pubic, which are usually described as three distinct bones.

The os ilium, or haunch bone, is of a very irregular shape. The lower part of it is thick and narrow; its superior portion is broad and thin, terminating in a ridge, called the *spine* of the ilium, and more commonly known by the name of *the haunch*. This spine rises up like an arch, being turned somewhat outward, and from this appearance, the upper part of the pelvis, when viewed together, has not been improperly compared to the wings of a phaeton.

This spine in the recent subject, appears as if tipped with cartilage; but this appearance is nothing more than the tendinous fibres of the muscles that are inserted into it. Externally, this bone is unequally prominent, and hollowed for the attachment of muscles; and internally, at its broadest fore part, it is smooth and concave. At its lower part there is a considerable ridge on its inner surface. This ridge, which extends from the os sacrum, and corresponds with a similar prominence, both on that bone and the ischium, forms, with the inner part of the ossa pubis, what is called the brim of the pelvis. The whole of the internal surface, behind this ridge, is very unequal. The os ilium has likewise a smaller surface posteriorly, by which it is articulated to the sides of the os sacrum. This surface has by some been compared to a human ear, and by others to the head of a bird; but neither of these comparisons seem to convey any just idea of its form or appearance. Its upper part is rough and porous; lower down it is more solid. It is firmly united to the os sacrum by a cartilaginous substance, and likewise by very strong ligamentous fibres, which are extended to that bone from the whole circumference of this irregular surface. The spine of this bone, which is originally an epiphysis, has two considerable tuberosities, one anteriorly, and the other posteriorly, which is the largest of the two. The ends of this spine too, from their projecting more than the parts of the bone below them, are called spinal processes. Before the anterior spinal process the spine is hollowed, where part of the sartorious muscle is placed, and below the posterior spinal process there is a very large niche in the bone, which, in the recent subject, has a strong ligament stretched over its lower part, from the os sacrum to the sharp-pointed process of the ischium; so that a great hole is formed, through which pass the great sciatic nerve and the posterior crural vessels under the pyriform muscle, part of which is likewise lodged in this hole. The lowest, thickest, and narrowest part of the ilium, in conjunction with the other two portions of each os innominatum, helps to form the acetabulum for the os femoris.

The os ischium, or hip-bone, which is the lowest of the three portions of each os innominatum, is of a very irregular figure, and usually divided into its body, tuberosity, and ramus. The body, externally, forms the inferior portion of the acetabulum, and sends a sharp-pointed process backwards, called the spine of the ischium. This is the process to which the ligament is attached, which was just now described as forming a great foramen for the passage of the sciatic nerve. The tuberosity is large and irregular, and is placed at the inferior part of the bone, giving origin to several muscles. In the recent subject it seems covered with a cartilaginous crust; but this appearance, as in the spine of the ilium, is nothing more than the tendinous fibres of the muscles that are inserted into it. This tuberosity, which is the lowest portion of the trunk, supports us when we sit. Between the spine and the tuberosity is observed a sinuosity, covered with a cartilaginous crust, which serves as a pulley, on which the obturator muscle plays. From the tuberosity, the bone becoming narrower and thinner, forms the ramus or branch, which passing forwards and upwards, makes with the ramus of the os pubis a large hole of an oval shape, called the *foramen magnum ischii*, which affords, through its whole circumference, attachment to muscles. This foramen will be more particularly noticed in describing the os pubis.

The os pubis, or share bone, which is the smallest of the three portions of the os innominatum, is placed at the upper and fore part of the pelvis, where the two ossa pubis meet, and are united to each other by means of a very strong cartilage, which constitutes what is called the *symphysis pubis*. Each os pubis

may be divided into its body, angle, and ramus. The body, which is the outer part, is joined to the os ilium. The angle comes forward to form the symphysis, and the ramus is a thin apophysis, which, uniting with the ramus of the ischium, forms the *foramen magnum ischii*, or *thyroideum*, as it has been sometimes called, from its resemblance to a door or shield. This foramen is somewhat wider above than below, and its greatest diameter is, from above downwards, and obliquely within outwards. In the recent subject it is almost completely closed by a strong fibrous membrane, called the *obdurator* ligament. Upwards and outwards, where we observe a nitch in the bone, the fibres of this ligament are separated, to allow a passage to the posterior crural nerve, an artery, and vein. The great uses of this foramen seem to be to lighten the bones of the pelvis, and to afford a convenient lodgment to the obturator muscles. The three bones now described as constituting the os innominatum on each side, all concur to form the great acetabulum, or cotyloid cavity, which receives the head of the thigh bone; the os ilium and os ischium making each about two-fifths, and the os pubis one-fifth of the cavity. This acetabulum, which is of considerable depth, is of a spherical shape. Its brims are high, and, in the recent subject, are tipped with cartilage. These brims, however, are higher above and externally, than they are internally and below, where we observe a nitch in the bone (which is the ischium), across which is stretched a ligament, forming a hole for the transmission of blood-vessels and nerves to the cavity of the joint. The cartilage which lines the acetabulum, is thickest at its circumference and thinner within, where a little hole is to be observed, in which are placed the apparatus that serves to lubricate the joint, and facilitate its motions. We are likewise able to discover the impression made by the internal ligament of the os femoris, which, by being attached both to this cavity and to the head of the os femoris, helps to secure the latter in the acetabulum. The bones of the pelvis serve to support the spine and upper parts of the body, to lodge the intestines, urinary bladder, and other viscera; and likewise to unite the trunk to the lower extremities. But besides these uses, they are destined, in the female subject, for other important purposes; and the accoucheur finds, in the study of these bones, the foundation of all his obstetrical knowledge. Several eminent writers are of opinion, that in difficult parturition, all the bones of the pelvis undergo a certain degree of separation. It has been observed likewise, that the cartilage uniting the ossa pubis is thicker, and of a more spongy texture, in women than in men, and therefore more likely to swell and enlarge during pregnancy. That many instances of a partial separation of these bones during labour have happened there can be no doubt; such a separation, however, ought by no means to be considered as an uniform and salutary work of nature, as some writers seem to think, but as the effects of disease. But there is another circumstance, in regard to this part of osteology, which is well worthy of attention; and this is, the different capacities of the pelvis in the male and female subject. It has already been observed, that the os sacrum is shorter and broader in women than in men; the ossa ilia are also found more expanded; whence it happens. that in women the center of gravity does not fall so directly on the upper part of the thigh as in men, and this seems to be the reason why, in general, they step with less firmness, and move their hips forwards in walking. From these circumstances also, the brim of the female pelvis is nearly of on oval shape, being consideraby wider from side to side, than from the symphysis pubis to the os sacrum; whereas in man it is rounder, and every where of less diameter. The inferior opening of the pelvis is likewise proportionably larger in the female subject, the ossa ischia being more separated from each other, and the foramen ischii larger, so that, where the os ischium and os pubis are united together, they form a greater circle; the os sacrum is also more hollowed, though shorter, and the os coccygis more loosely connected, and therefore capable of a greater degree of motion than in men.

To I'NNOVATE. *v. a.* (*innover*, Fr.) 1. To bring in something not known before (*Bacon*). 2. To change by introducing novelties (*South*).

INNOVA'TION. *s.* (*innovation*, French.) Change by the introduction of novelty (*Swift*).

INNOVA'TOR. *s.* (*innovateur*, French.) 1. An introducer of novelties (*Bacon.*) 2. One that makes changes by introducing novelties (*South*).

INNO'XIOUS. *a.* (*innoxius*, Lat.) 1. Free from mischievous effects (*Digby*). 2. Pure from crimes (*Pope*).

INNO'XIOUSLY. *ad.* 1. Harmlessly; without harm done. 2. Without harm suffered (*Brown*).

INNO'XIOUSNESS. *s.* (from *innoxious.*) Harmlessness.

INNUE'NDO. *s.* (*innuendo*, from *innuo*, Lat.) An oblique hint (*Swift*).

INNU'MERABLE. *a.* (*innumerabilis*, Lat.) Not to be counted for multitude (*Milton*).

INNU'MERABLY. *ad.* (from *innumerable.*) Without number.

INNU'MEROUS. *a.* (*innumerus*, Latin.) Too many to be counted (*Pope*),

INO, in fabulous history, a daughter of Cadmus and Harmonia, who nursed Bacchus. She married Athamas, king of Thebes, after he had divorced Nephele, by whom he had two children, Phryxus and Helle. Ino became mother of Melicerta and Learchus, and soon conceived an implacable hatred against the children of Nephele, because they were to ascend the throne in preference to her own. Phryxus and Helle were informed of Ino's machinations, and they escaped to Colchis on a golden ram. Juno, jealous of Ino's prosperity, sent Tisiphone to the pa-

lace of Athamas, who filled it with such fury, that Athamas taking Ino to be a lioness, and her children whelps, pursued her, and dashed her son Learchus against a wall. Ino escaped his fury, but from a high rock threw herself into the sea, with Melicerta in her arms. The gods pitied her, and Neptune made her a sea deity, afterwards called Leucothoe. Melicerta became also a sea god, known by the name of Palæmon.

INOA, festivals in memory of Ino, celebrated yearly with sports and sacrifices at Corinth, Megara, and Laconia.

INO'CARPUS. In botany, a genus of the class decandria, order monogynia. Calyx bifid; corol funnel-form; stamens in a double series; drupe one-seeded. One species; a tree of Australasia, with oblong entire leaves and axillary spikes.

To INO'CULATE. *v. n.* (*inoculo*, Lat.) To propagate any plant by inserting its bud into another stock; to practise inoculation (*May*).

To INO'CULATE. *v. a.* To yield a bud to another stock (*Cleaveland*).

INOCULATION, (*inoculatio*, from *in*, and *oculus*, an *eye* or *bud*.) The propagation of a disease among animals or of a particular species of plant, among vegetables, from one individual to another, by inserting a minute drop of the matter of the former, or a bud or eye of the latter, into some part of the system that is intended to receive it.

Inoculation is, therefore, a classific term: and we shall hence treat of it under the two orders of ANIMAL and VEGETABLE.

ANIMAL INOCULATION

Is employed with the view of introducing into a fresh subject a subdued and milder sort of a disease that is naturally severe or dangerous: or a milder disease of one kind that is capable of protecting the constitution against a severer and more dangerous disease of another kind. It is hence clear that the only cases in which it can reasonably be had recourse to, are in diseases that seldom or never attack the constitution more than once during life, that are perilous in their natural course, and which from their being infectious or contagious, it is not easy to guard against.

The diseases in which inoculation has been chiefly practised are the following:

1. Variolus—Small-pox.
2. Vaccina—Cow-pox.
3. Rubeola—Measles.
4. Framboesia—Yaws.

Besides which it has been tried upon quadrupeds in

5. Glanders, } among horses.
6. Farcy, }
7. Distemper among dogs.

It is not necessary, in a popular work, to enter into any full detail upon each of these different kinds of inoculation. It is sufficient for us to observe, that in some (as in the measles and yaws, and distemper), it appears to have been an unnecessary diffusion of disease; in others (as in the measles, farcy and glanders) a doubtful mode of propagation; and in others again (as the glanders and distemper) an officiousness productive rather of mischief than of benefit; for it is an extraordinary result that the greater number of horses and dogs upon which inoculation from these diseases, has been tried, have had them more severely than the animals from which the morbid matter has been taken.

The only diseases, therefore, that are advantageously had recourse to for the purpose of inoculation are the small-pox and the cow-pox, and both in reality, with a similar intention, which is that of protecting the constitution against the fatal effects of the small-pox in its natural violence; the former by introducing into it a milder modification of the same disease, the latter by acting as a prophylactic. The processes by which these two diseases are introduced into the system, are denominated *variolation* and *vaccination*: or more correctly *variolous* and *vaccine inoculation*: the former terms not being strictly correct; since considered abstractedly they only refer to the diseases themselves generally, and not to any particular mode of their propagation. We shall give as detailed an account of each of them as the limits to which we are necessarily bound will allow.

VARIOLOUS INOCULATION.

The history of this method of introducing the small-pox into the system needs not to detain us: and we shall hence only remark that the custom of *buying* the small-pox (as it was called) was prevalent in Wales long before the introduction of inoculation by lady M. W. Montague, who it is well known derived her knowledge from Turkey, and first tried its effects in this country in the beginning of the last century. It was long opposed with all the obstinacy and violence that has, in our own day, characterised the introduction of vaccination, but its advantages were at length fully recognized, and it became generally established. These advantages were three-fold: first a diminution in the mortality of the infected, for while under the natural small-pox it was calculated that the deaths were as one in seven, under the improved method they were not more than as one to three hundred, and perhaps by no means so many. Secondly the inoculated disease was found to be not only less dangerous in result, but simpler, and less complicated in its diagnosis: it was usually far milder, and seldom ran into the confluent state. But thirdly even when most violent it was unsucceeded by secondary fever; a circumstance, concerning which we cannot reason, but which forms a distinctive and peculiar character of small-pox. In thus fairly estimating its value, however, we ought not to conceal one essential evil of which variolus inoculation was productive; and that is the spread of the variolus infection through a much wider area of the country than it otherwise would have occupied; so that while individuals were very highly benefited, the community was daily suffering, and more than forty thousand were calculated, a few years ago, to fall victims annually to this rapacious scourge.

Among the inferior advantages which were supposed to accompany variolous inoculation, we may mention a choice of matter, and of habits: but by experiments, perhaps scarcely justifiable, it appears to have been ascertained that the matter of the confluent or even of a putrid kind will also produce a favourable crop; that constitutions exhausted by other diseases, do not suffer considerably; and that the time of life or the season, with moderate precautions, exert

but little influence. The only difference we can perceive is, that in the inoculated small-pox, the infection is received under the skin, in the natural kind in the lungs or throat, perhaps the stomach, but the lungs and throat are the more probable seat, and the sensation felt in the stomach, after infection of every kind, seems rather from sympathy than actual impression. We know not that air, in any instance, except in combination, enters the latter organ. The prevention of the secondary fever is a problem of peculiar difficulty. We have attributed it to the matter absorbed; but though it occurs at the period of absorption, this cannot be the only cause, for even a considerable load of inoculated small-pox disappears without its occurrence. We pretend not to solve the problem, but have distinctly stated it to excite attention. Inoculation is not by choice practised on very old persons or young infants. If the mother be the nurse, her anxiety will often injure the milk and add to the irritation, nor should we omit the consideration, that fits at this period are not uncommon; and though usually the harbingers of a mild kind, may themselves prove fatal. After about six months, the irritation of teeth offers another obstacle which is not completely avoided until the second year. A period of considerable risk in a large town where small-pox is seldom absent. These precautions are however frequently overlooked without considerable inconvenience. Children are often inoculated within the first six months, and afterwards, if no swelling of the gums, shows the near approach of a distending tooth. Unexpected occurrences sometimes undoubtedly derange our plans, but though these give often the appearance of danger, the disease is seldom rendered truly dangerous. Advanced age offers no real impediment, and exhausted constitutions often go through the disease more mildly than others. We once on an emergency inoculated a whole family, and among the rest an infant at the breast, then labouring under a severe fever, calculating from the circumstances, that this might be checked before the variolous fever came on. Its crisis was only on the morning before the accession of the latter, and the child escaped better than seven others. We mean not to recommend the practice, but surrounded by small-pox even in the house it was the only chance which remained. We know of no constitutional disease that should prevent inoculation. The season of the year is not important. We generally prefer the middle seasons, when free air out of doors, may be constantly breathed, and when the temperature is sufficiently low to employ cold as a remedy. The spring is avoided by some practitioners as the period of inflammatory complaints. The autumn by others, as that of putrid ones. The summer as too hot, the winter as too cold, but these are idle refinement which merits no attention. The extremes of heat and cold, for the reasons assigned, are not to be selected by choice. Equal refinement has prevailed respecting the preparation, and each practitioner had for a time his favourite medicine, of which calomel and tartarized antimony were usually parts. If a person be full, active and strong, the diet may for a time be lowered, and as it is proper to prevent accumulations in the bowels, calomel may be employed as a purgative as well as any other medicine. As a vermifuge in children it may be superior to any other. In general, except in inflammatory habits peculiarly full, and children grossly fed, there is sufficient time for the preparation, after the matter is inserted: should the wound inflame rapidly, our exertions in reducing the strength must be increased. The operation itself is the simplest possible, consisting, like vaccination, only in raising the skin and introducing under it the variolous matter. Sutton attributed much of his success to using fluid matter, at an early period of the pustule. And it is certainly preferable, for at a more advanced age it partakes of the nature of common pus and produces more inflammation than would arise from matter exclusively variolous. In genera it is safer to procure a drop of blood, which should not be wiped away, but suffered to congeal.

The puncture sometimes remains many days without the slightest change, and occasionally the mark appears to lessen; if the operation, however, have been successful, it does not heal. And this is often the only foundation for supposing that the infection has taken place. In other circumstances it begins to inflame in a few hours, and after four and twenty becomes a highly inflammatory pustule: a rapid advance, which usually portends a violent disease. In the greater number of cases, after about twenty-four, or at most forty-eight hours, a little swelling may be observed on the wound, and on examining it with a lens, a little orange coloured circle appears around it. On the fourth or fifth day, a hardness may be perceived where the puncture was made, an itching is felt, and a slight inflammation is observable; on the sixth day a pain and stiffness are mostly felt in the axilla, which continue until the tenth or eleventh day, foretelling the near approach of the eruption, and a favourable progress. On the seventh or eighth day the eruptive symptoms appear, such as slight pains in the head and back, stiffness in the arm-pit, transient shiverings with alternate heat, &c. which continue more or less until the eruption is completed. The inflammation in the arm spreads, and little pustules surround the wound, which increase in size as the disease advances. On the tenth or eleventh day an efflorescence round the puncture sometimes extends half way round the arm, and the larger it is, the fewer the pustules and the milder the disease. When it accompanies the eruption the fever and other uneasy symptoms subside, and all danger is at an end. If none of the symptoms on the arm appear before the eighth day, the inflammation, &c. about the puncture rise suddenly, and this is generally, though without reason, regarded as a mark of danger. Mr. Sutton repeats the evacuation from the time of infection to this period, and observes, that when the skin is hot and dry, reiterated doses of salts are more useful than the mercurial medicine. The favourable symptoms are an orange coloured stain, about the edges of the puncture on the second day, followed by an itching and a vesication without much inflammation on the third or fourth day, but not delayed beyond the sixth. A pain and stiffness in the axilla; the large efflorescence on the puncture about the tenth or eleventh day. A hardness which spreads from the puncture as from the centre, and a little dry scab on the inflamed part when it rises to an apex. The less favourable symptoms are a purplish instead of a red coloured inflammation, or a narrow deep red circle surrounding the puncture, and a depression or concavity in the middle of the incrustation. When the fever

has come on, no particular medicine is required, but if every circumstance be not favourable, our conduct must be the same as in the natural small-pox, where similar symptoms occur. Boerhaave first suggested that an eruption was not necessary, and there is little doubt, but that the real disease consists in the fever, at the proper period after infection. Even after eruptions have appeared, we have seen them checked without maturation by free exposure to cold air, nor did the patient experience the slightest inconvenience. If then a portion of our fluids be to be assimilated by the ferment, it is necessarily a small one, and soon disappears. In fact, however, the assimilatory process takes place only in the pustules.

Vaccine Inoculation.

This kind of inoculation, as we have already observed, is not intended to procure a milder modification of cow-pox or vaccina, but merely to act as a prophylactic against small-pox or variola. It is a science altogether of modern invention; and as no subject of medicine has ever excited more, and very few subjects so much attention, through the whole civilized world, on account of the magnitude of the benefit likely to result from it, it would be unpardonable in a work of this description to pass it by without some kind of critical examination and historic detail. We shall consider it, therefore, under the distinct heads of its *history*, its *rationale*, so far as we may be able to hazard any ideas that may be entitled to such a name, its *practice*, and the *objections* that have been advanced against it, or the causes that have retarded its general adoption.

History of Vaccination. The inventor of this science is well known to be Dr. Jenner; and it arose, as most other sciences have done, from mere accident. As it is impossible to add to the perspicuity of this gentleman's own account of its origin, in his examination before a committee of the House of Commons, constituted for the purpose of investigating its merits, we shall take leave to copy his own words. "My inquiry into the nature of the cow-pox commenced upwards of twenty-five years ago. My attention to this singular disease was first excited by observing, that among those whom in the country I was frequently called upon to inoculate, many resisted every effort to give them the small-pox. These patients I found had undergone a disease they called the cow-pox, contracted by milking of cows affected with a peculiar eruption on their teats. On inquiry, it appeared it had been known among the dairies time immemorial, and that a vague opinion prevailed that it was a preventive of the small-pox. This opinion I found was, comparatively, new among them; for all the older farmers declared they had no such idea in their early days: a circumstance that seemed easily to be accounted for, from my knowing that the common people were very rarely inoculated for the small-pox, till that practice was rendered general by the improved method introduced by the Suttons: so that the working people in the dairies were seldom put to the test of the preventive powers of the cow-pox. In the course of the investigation of this subject, which, like all others of a complex and intricate nature, presented many difficulties. I found that some of those who seemed to have undergone the cow-pox, nevertheless on inoculation with the small-pox, felt its influence just the same as if no disease had been communicated to them by the cow. This occurrence led me to make inquiry among the practitioners in the country around me, few of whom were unacquainted with the disease, but all agreed in this sentiment, that the cow-pox was not to be relied upon as a certain preventive of the small-pox. This for a while damped, but did not extinguish my ardour; for, as I proceeded, I had the satisfaction to learn that the cow was subject to some varieties of spontaneous eruptions upon her teats; that they were all capable of communicating sores to the hands of the milkers; and that whatever sore was derived from the animal, was called in the dairy the cow-pox. Thus I surmounted a great obstacle, and in consequence was led to form a distinction between these diseases, one of which only I have denominated the true, the other the spurious, cow-pox; the latter not possessing any specific power over the constitution. This impediment to my progress was not long removed, before another, of far greater magnitude in its appearance, started up. There were not wanting instances to prove, that when the true cow-pox broke out amongst the cattle at a dairy, a person who had milked an infected animal, and had thereby apparently gone through the disease in common with others, was liable to receive the small-pox afterwards. This, like the former obstacle, gave a painful check to my fond aspiring hopes: but reflecting that the operations of nature are generally uniform, and that it was not probable the human constitution, having undergone the cow-pox, should in some instances be perfectly shielded from the small-pox, and in many others remain unprotected, I resumed my labours with redoubled ardour. The result was fortunate; for I now discovered that the virus of cow-pox was liable to undergo progressive changes from the same causes precisely as that of small-pox; and that when it was applied to the human skin in its degenerated state, it would produce the ulcerative effects in as great a degree as when it was not decomposed, and sometimes far greater; but having lost its specific properties, it was incapable of producing that change upon the human frame which is requisite to render it unsusceptible of the variolous contagion; so that it became evident a person might milk a cow one day, and, having caught the disease, be for ever secured; while another person, milking the same cow the next day, might feel the influence of the virus in such a way as to produce a sore or sores, and in consequence of this might experience an indisposition to a considerable extent; yet, as has been observed, the specific quality being lost, the constitution would receive no peculiar impression: here the close analogy between the virus of small pox, and of cow pox, becomes remarkably conspicuous; since the former, when taken from a recent pustule, and immediately used, gives the perfect small-pox to the person on whom it is inoculated; but when taken in a far advanced stage of the disease, or when (although taken early) previously to its insertion, it be exposed to such agents as, according to the established laws of nature, cause its decomposition, it can no longer be relied on as effectual. This observation will fully explain the source of those errors which have been committed by many inoculators of the cow-pox, conceiving the whole process to be so extremely simple as not to admit of a mistake, they have been heedless about the state of the vaccine virus; and finding it limpid, as part of

it will be, even in an advanced stage of the pustule, when the greater portion has been converted into a scab, they have felt an improper confidence, and sometimes mistaken a spurious pustule, which the vaccine fluid in this state is capable of exciting, for that which possesses the perfect character, during the investigation of the casual cow-pox, I was struck with the idea that it might be practicable to propagate the disease by inoculation, after the manner of the small-pox, first from the cow, and finally from one human being to another. I anxiously waited some time for an opportunity of putting this theory to the test, at length the period arrived. The first experiment was made upon a lad of the name of Phipps, in the spring of the year 1796, in whose arm a little vaccine virus was inserted, taken from the hand of a young woman who had been accidentally infected by a cow, notwithstanding the resemblance which the pustule, thus excited on the boy's arm, bore to variolus inoculation, yet as the indisposition attending it was barely perceptible, I could scarcely persuade myself the patient was secure from the small-pox; however, on his being inoculated some months afterwards, it proved that he was secure. This boy was again inoculated nearly five years afterwards with variolous matter, but no other effect was produced beyond a local inflammation around the punctured part upon the arm: this case inspired me with confidence; and as soon as I could again furnish myself with virus from the cow, I made arrangement for a series of inoculations; a number of children were inoculated in succession, one from the other; and after several months had elapsed, they were exposed to the infection of the small-pox; some by inoculation, others by variolous effluvia, and some in both ways; but they all resisted it: the result of these trials gradually led me into a wider field of experiment, which I went over not only with great attention, but with painful solicitude; this became universally known through a treatise published in June 1798. The result of my further experience was also brought forward in subsequent publications in the two succeeding years, 1799 and 1800. The distrust and scepticism which naturally arose in the minds of medical men, on my first announcing so unexpected a discovery, has now nearly disappeared, many hundreds of them, from actual experience, have given their attestations that the inoculated cow-pox proves a perfect security against the small-pox; and I shall probably be within compass if I say, thousands are ready to follow their example; for the scope that this inoculation has now taken is immense, an hundred thousand persons, upon the smallest computation, have been inoculated in these realms, the numbers who have partaken of its benefits throughout Europe and other parts of the globe are incalculable: and now it becomes too manifest to admit of controversy, that the annihilation of the small-pox, the most dreadful scourge of the human species, must be the final result of this practice."

We have commenced this article with an assertion that Dr. Jenner is unquestionably entitled to the honour of having invented this important science. And we have preferred this expression to an affirmation that he was the original discoverer of the facts on which vaccination *as a science* is founded: for it would be in vain to dispute that the elementary facts were not known, and were not in a few instances adverted to occasionally as a preservation against the small-pox. In truth, in the passage we have just quoted, Dr. Jenner himself admits that, from time immemorial a vague report had prevailed in the county in which he then resided (Gloucestershire) that the disorder called the cow-pox was a preventive of small-pox: and in the course of the evidence given before the same committee of the House of Commons upon the same subject, it still farther appears by the evidence of Mr. Nicholas Bragge, Sir W. Elford, Baronet, Mr. Keate, and Mr. Thos. Nash, that various persons had been occasionally inoculated from the diseased udder of the cow by different medical practitioners, as early as nearly half a century ago, not merely by way of experiment, but from a full knowledge that such inoculation would become a perfect protection against the small-pox. In one instance indeed, the subject appears to have been very nearly systematized, (and perhaps, in point of fact, was so) as well as very nearly brought before the public: a Mr. Thomas Nash, having not only actually inoculated in various instances from the cow, but having left behind him upon his death in 1785, a quantity of manuscript papers evidently intended for publication in some shape or other, of which the following is an extract: "It is rather remarkable that no writer should have taken notice of the cow-pox. I never heard of one having the small-pox who ever had the cow-pox; the cow-pox certainly prevents a person from having the small-pox. I have now inoculated above sixty persons who have been reported to have had the cow-pox, and I believe at least forty of them I could not infect with the variolous virus; the other twenty, or nearly that number, I think it very reasonable to presume (as they were no judges) had not the real cow-pox: it is not my own opinion only, but that of several other medical gentlemen, that convinces me the cow-pox is a prophylactic for the small-pox. I have not been able to discover that the human species get it from the cows in any other manner than by contact with the parts immediately infected, such as in milking; neither do I apprehend that one of the human species can communicate it to another, but by the same means as I have known some of the inhabitants of a house where it was, escape it, but none of those who lay in the same bed with a diseased person. In Mrs. Scammell and Mrs. Bracher, inoculation produced no eruption, no sickness, and little or no suppuration of the arm, the place punctured not being bigger, when inflamed and suppurated, than a large pin's head: it frequently leaves considerable marks, which are much larger than those of the small-pox, as large (I have measured some) as a silver threepence."

It becomes us also to state that the Rev. Herman Drew put in a kind of claim to the discovery before the committee, in a letter addressed for this purpose to Sir W. Elford, baronet, as the following extract will sufficiently testify.

"April 1, 1802, Abbots, near Honiton."

"Dr. Edward Jenner has undoubtedly very great merit in bringing the vaccine inoculation into practice, but he is no more the discoverer of the cow-pox and its effects than I am. Nearly twenty years ago, I wrote sheets of paper to Sir George Baker, on this disorder, and I know not what occasioned his laying aside his intention of publishing his investigations: he had had a *previous correspondence* with Dr. Pulteney of Bland-

ford on the subject. Sir George desired me to inoculate with matter taken from the cow; but my endeavours to find out where I might get matter were for a long time unsuccessful, owing to the secrecy of the farmers, whose dairies, with such a filthy ulcerous distemper, would have marred the sale of their butter," &c.

Notwithstanding this general but obscure knowledge, however, and the recourse which was had to the disease, *as it existed in the cow* itself, by way of a preservative against the small-pox, in a few casual cases, and notwithstanding the chance, there is that, if Dr. Jenner had not brought the subject fully before the public at the time he actually did, it could not have remained dormant much longer; yet in point of fact, Dr. Jenner appears to have been the first person who actually did introduce the subject before the public; while in the additional discovery of the general laws by which the true cow-pox is regulated, of the essential character by which it is distinguished from the spurious cow-pox, and of its capability of being propagated from one human being to another, he stands altogether without a competitor. The peculiar and precise merit of Dr. Jenner upon this subject is, indeed, well marked by the committee in the following extract from its report: "The practice of which Dr. Jenner asserts himself to be the original inventor is the inoculation from one human being to another, and the mode of transferring, indefinitely, the vaccine matter, without any diminution of its specific power, to which it does not appear that any person has ever alleged a title; and these papers and experiments, whatever accuracy of observation and spirit of research they may evince in their respective authors, and to whatever extent they may be supposed to go, as they were never given to the public, so neither is there any intimation that they were imparted to Dr. Jenner; nor is it contended that the world became acquainted with this discovery by any other means than by the course of trials conducted by the petitioner and by his ample and unreserved communications.

"Upon this last division of the subject, continues the report, evidence has been received from persons who were acquainted with the medical practice, and former situation of Dr. Jenner, which confirms the allegation contained in the petition, that he has not only reaped no advantage from his discovery, but that he has been a considerable loser by the persevering attention which he has bestowed upon this one subject, to the neglect of his other business, and without an opportunity of replacing himself in the situation, which a desire of publishing and diffusing more extensively, and establishing beyond the reach of controversy the practice itself, induced him to quit what his gains might probably have been, if he had been solicitous to keep the secret within his own practice, and that of his immediate pupils, as far as medical men, in great practice themselves, can form a conjectural opinion, may be collected from various testimonies, in which no more than justice is done to the liberality and public spirit of the petitioner, in pursuing the propagation and extension of this important discovery, and in rendering it rather of universal utility to the human race, than of emolument to himself."

The result of this report, as delivered by the committee to the House of Commons was, that in June 2, 1802, a motion was made by Admiral Berkeley, the chairman of the committee, for a grant of 10,000l. as a public remuneration to Dr. Jenner for the discovery he had so liberally communicated to the public, upon a matter in which its health and happiness were so deeply interested. An amendment was offered upon this motion, that the reward should be 20,000l. instead of 10,000l.; but upon a division the original motion was carried though by a majority of not more than three out of a hundred and fifteen votes. Since this period, however, a second remuneration of 20,000l. has been voted from the same quarter; so that the active and benevolent inventor has now received a reward of 30,000l. from the public purse, a sum which the nation has never regretted, and we may confidently affirm will never have reason to regret.

Before we close this section on the history of vaccination, we will just hint that there is some question whether the cow-pox have not been for ages known among the Bramins of India, as a prevention of small-pox, and occasionally had recourse to for this purpose through the medium of inoculation from the diseased cow? Mr. Shoolbred, to whose report we are indebted for almost the whole we know upon this subject, received a Sanscrit manuscript, containing a passage, highly in favour of such an opinion; and a communication from a correspondent at Bassaret intimating that the matter of the cow-pox, or at least, of some vaccine eruption had been sought after for the purpose of inoculation as a preservative against the *bussunt* or small-pox by a practitioner of Bisnapore about eighteen years ago, who applied for this purpose to a farmer in the district of Bardwan, and whose cows and bullocks were reported to be affected with this or some other eruptive disease. This last communication, however, does not appear to possess sufficient authority, in its present state, to form a solid datum for any opinion, and Mr. Shoolbred is very properly engaged in examining more correctly into the truth of the assertion: while in regard to the Sancrit passage said to have been extracted from the *Sud'hasangraha* of a physician named Mahádéva, and who flourished under the patronage of *Rajá, Rajá sinha*, there can be little doubt of its being a forgery: no such passage whatever, nor any allusion of any kind to the subject in question being to be traced in other copies of the same work, several of which were collated for this purpose by Mr. Blaquiere, a gentleman perfectly competent from his acquaintance with the original tongue to form an accurate judgment. In truth, the attempts of the Bramins to impose on the credulity of Europeans by pretences to an immemorial acquaintance with almost every subject of science, literature, and even criticism, that may be proposed to them, is no novelty: and after the deception, which in two instances, was successfully practised upon Sir W. Jones, it would be by no means singular that they should exert themselves in the same manner, and become equally successful in other cases.

RATIONALE OF VACCINATION. In the course of the evidence upon the cow-pox exhibited before the committee of the House of Commons, it was admitted by several of the witnesses who have now the highest opinion of its great practical benefit, that they opposed it in the first instance from a rigid disbelief of the possibility of the

fact: a pretension so singular, and unsupported by collateral occurrences, as that of preventing the small-pox, by the introduction of another disease, the exclusive property of another animal, seemed in their opinion, till they were overpowered by the body of evidence they afterwards met with, to carry its own confutation along with it, and to be unworthy of serious examination. Nevertheless the fact itself, when examined in a physiological view, is by no means so outrageous to all other facts, so isolated and alone as many persons may be induced to conceive at the first view of it.

It was a favourite maxim of one of the first physiologists this country has ever been able to boast of, we mean Mr. John Hunter, that two morbid actions of different natures cannot coexist in the same animal frame: and that in every case in which two such actions are introduced at the same time, the stronger will entirely destroy the weaker, or else postpone its exertion, and reduce it to a state of dormancy, till it have completed its own course, and worn itself out in its own way: and he hence opposed all such anomalous ideas as that of a *rhumatic gout*, upon the principle that such disease must be a compound of two distinct maladies, each resulting from a distinct specific action, the one of which actions must necessarily overpower the other, and take exclusive possession of the constitution as the consequence of its own victory.

This kind of antagonism between different morbid powers cannot have escaped the notice of any practitioner who has paid but a very small degree of attention to the phænomena of his own profession; and while upon a minuter survey it will be found to ramify into latitudes but little thought of, it will be found at the same time to lay a basis for explaining facts which are at present judged inexplicable. If a child who has received the miasm of measles be inoculated for the small-pox, the practitioner who is unaware of this rule may be surprised that the puncture should evince no sign of inflammation, and when he perceives that the measles, at length, makes their appearance over the body, still judging from the vacant state of the puncture, he will suspect that the inoculation has miscarried, and will perhaps ascribe such miscarriage to the previous action of the measles. But the measles in this case have not destroyed the variolous virus, they have only suspended its action; and in a few days afterwards, as soon as they have passed through their course, he will find that the variolous virus has been set at liberty, and has commenced its own specific operation on the constitution.

In this fact we have an instance of such a change produced on the constitution by one disease, as to guard it *for a given time* against the action of another. The disease called *ring-worm* or *shingles*, and in effect, almost every species of herpetic eruption, will in like manner, during its action protect in many instances, though not in all, against the attack of small-pox or measles. And it often happens that the change hereby produced in the system will extend *to a considerable period* beyond the term of the specific action itself: thus a man who has just recovered from a synochus or inflammatory fever, may be more safely, and for a very considerable time afterwards exposed to the contagious aura of a typhus or putrid fever, than a man who is enjoying perfect health, and has never suffered from any disease in his life. A change has hereby been produced in the system which incapacitates it from being stimulated into action by infectious effluvia, (perhaps of various kinds) that would otherwise be sure of operating, and probably of operating fatally. How long such change may continue it is difficult to say. In the case now supposed, it may not be of any very long duration; in other instances, it appears to last as long as life itself; for it occurs but seldom that persons who have had hooping-cough, measles, small-pox or scarlet fever once, become subject to these diseases a second time.

Changes of this description, producing the most complete protection against the constitutional action of different kinds of morbid matter, are often accomplished by other means, and means so totally destitute of all violence, as to be altogether invisible in their process.

In the kingdom of Sennaar, all the blacks are protected, naturally, against the bite or poison of the viper: the Arabians, on the contrary, are not *naturally* protected, but they are able to protect themselves, and are certain to guard themselves against the fatal effects of the poison of the cerastes, by having for some time antecedently chewed the roots of certain plants, which are at present only doubtfully classified in botany, and by washing themselves with an infusion of the same. This is not mere fable: the negroes of South America are in possession of the same, or at least of similar plants of the class and order pentandria, monogynia, with a monopetalous, infundibuliform corol, found indigenously in the viceroyship of Santá-Fe; and which, by Don Pedro d'Orbies y Vargas, is denominated *vejuca du guaco.* The juice of this extraordinary plant, indeed, has the double power of equally protecting the system against the effects of the poison of any viper, if drunk in small quantities, for some time antecedently, so that the poison, when introduced into the constitution, will prove perfectly harmless, and of curing the wound produced by the bite of a serpent, if taken immediately afterwards: so that the natives of Santá-Fe, acquainted with this plant, lay hold of the most venomous serpents with their naked hands, and in the most careless manner imaginable, without sustaining the smallest injury whatever. The constitutional change hereby produced, is so free from violence, as to be altogether invisible, and insensible; but it is nevertheless as much *ad rem*, and as effectually protects the system from the fatal action of the morbid matter, as if it were accomplished by a disease that of itself endangered the life of the person who thus swallows the antidote.

To what extent of time this artificial protection of the system extends after it has been once charged with the juice of the vejuca, we have not been able to collect any certain information. But from facts of every day's recurrence, we are as competent to state that a *long* and *durable* change may as certainly be operated upon the animal system by gentle as by severe means. The man who has had the natural small-pox, in a way so slight as not to confine him for a moment to his bed, and to produce a crop of not more than twenty or thirty pustules, is at least as effectually protected, and perhaps more so, and for as long a period of time, as the man who has suffered under a confluent attack, and whose whole face and body are become seamed by the intermixture and ulceration of the pustules.—Inoculation, in like manner, uniformly produces

a milder disease than the natural variola, but a disease quite as effectual as a subsequent safeguard; and the same may be observed of every other disorder that usually occurs but once in the course of the same life.

It is probable that every animal poison, were we but acquainted with it, may be attacked with a natural antidote; and that in many cases there may be various antidotes to the same poison; nor is it by any means improbable, that of these antidotes or specifics, some may possess a power of one kind or degree, and others of other kinds or degrees: that some are hereby capable of acting only at the moment, and others of prolonging their action for an indefinite period of time: some of destroying the morbid matter by chemically changing its nature, and others of resisting its effect by changing the nature of the system that receives it. The juice of the vejuca is a specific against the poison of the viper; the bark of several species of the cinchona tree against the miasm of stagnant marshes; in a state of barbarous and uncivilized life, sarsaparilla and guaiacum are perhaps specifics against the venereal virus, and quicksilver against it in every state of life.

In like manner the small-pox now appears to possess its antidote or specific, or rather perhaps to possess several: the matter of the cow-pox is certainly an antidote; and from various experiments that have been made in our own country, in France, and Italy, there can be little doubt that the grease of the horse is another antidote, this also having been found, upon such experiments, to protect the human frame as efficaciously against the virus or contagion of the small-pox as the matter of the cow-pox itself. It is not unlikely that future physicians and physiologists may detect other antidotes to the same disease, though the attempt seems at present to be unnecessary. Of such antidotes it would probably be found that some would exercise a more permanent control over the human frame than others: and perhaps that the same which exercised the most permanent control over some constitutions, would exercise a much less permanent control, or even none at all, over other constitutions. The change produced by the natural small-pox itself, is not in every instance so completely efficacious as to prevent the recurrence of the same disease in the same person, at a distance of twenty or thirty years; and hence we have instances of a few persons who have had the natural small-pox twice within this period of time. The same observations may apply both to cow-pox, and what we may now fairly denominate grease-pox: in the former, at least, we have had various proofs of temperaments that have resisted the beneficial influence of its application; and we are yet perhaps too young in the science of either to determine, with absolute precision, the utmost duration of time to which either of them is capable of extending its protection. Judging from the field of practice at present before the world, we have great reason to suppose that the influence of the cow-pox, excepting in those peculiar temperaments which do not appear to be susceptible of any beneficial impression from its use, will last as long as the ordinary course of human life; and as there is something far less nauseating in this specific than in that derived from the grease of the horse's heal, there can be little doubt that it will, even upon equal terms, be at all times infinitely more popular than the latter: the science, however, is yet too much in a state of infancy, to decide with positive precision upon every point connected with it; which, like every other new and unexpected discovery, can only be satisfactorily settled by a long succession of time and an uniform course of experience. We have nevertheless much well grounded reason, derived both from facts and analogy, for believing that time and additional experience will establish vaccination as a perfect preservative against the small-pox to the utmost extent of old age: yet should its influence be found ultimately to terminate (which however is mere hypothesis) in about twenty, or five and twenty years, the discovery would still be entitled to be considered as one of the most important, and replete with the greatest benefit to mankind, that either chance or genius has ever put us into possession of; for even with such a limitation of power, it might be made an effectual instrument, under proper regulations and universal acceptation, of completely expelling the small-pox from our own country, to which it is not indigenous, and perhaps of crushing it in every quarter of the world.

Mode of Practice. Any pustulous or vesicular eruption affecting the cow may be called a cow-pox: but the true or genuine cow-pox, or that which has, of late years, been thus pre-eminently denominated, is the eruption on the udder of the cow which alone is capable by inoculation of proving a specific against the infection of small-pox in the human subject. It is these that produce the casual cow-pox among the milkers, upon whose hands and often upon other parts of the body the disease throws out a variety of characteristic marks, and offers a variety of characteristic symptoms.

Casual Cow-pox. Inflamed spots, soon after infection begin to appear on the hands, wrists, and especially the joints and tips of the fingers; and these spots at first resemble the small blister of a burn, but quickly run on to suppuration. The vesicle is quite circular, depressed in the middle, and of a blueish colour, and is surrounded wtth a considerable redness. The blue colour which the vesicle almost invariably assumes, when the disorder is communicated directly from the cow, is one of the most characteristic marks whereby the genuine cow-pox may be distinguished from some other diseases which the milkers are likewise liable to receive from the cow. The matter of the vesicle is at first thin and colourless; but, as the disorder advances, it becomes browner and more purulent. In a few days from the first eruption, a tenderness and swelling of the glands in the arm-pit come on, and soon after, the whole constitution becomes disordered, the pulse is increased in quickness, and to this succeed shiverings, a sense of weariness, and aching pains about the loins, vomiting, head-ach, and sometimes even a slight degree of delirium.

These symptoms continue with more or less violence from one day to three or four, and, when they subside, they leave ulcerated sores about the hands, which are very apt to become ill-conditioned and heal very slowly; resembling, in this respect, the ulcers on the nipple of the cow, from which they originate.

It is to be observed, that the cow-pox eruption, though very severe on the hands, and though occasioning much general illness, never produces a spontaneous crop of pustules over distant parts of the body, as the small-pox does.

It does, indeed, often happen, that pustules are formed in various places which accidentally come in contact with the diseased hands, as on the nostrils, lips, and other parts of the face, where the skin is thin; or sometimes on the forehead, when the milker leans with that part upon the udder of an infected cow.

From this account it appears that the cow-pox, as it affects the milkers, or what may be termed the casual cow-pox in the human species, is often a severe disorder, sometimes confining the patient to his bed during the period of fever, and generally leaving troublesome sores; but it has never been known to prove fatal; nor are these sores, if properly attended to, followed with any lasting injury of the affected parts, though they sometimes leave scars for life.

From this description of the *casual cow-pox*, we advance to a consideration of the *inoculated* cow-pox.

Every one is acquainted with the important distinction which exists between the small-pox as propagated by contagious effluvia, and that communicated by artificial insertion of matter beneath the skin; and the decisive advantages which the inoculated disease possesses over the natural are universally acknowledged, though the precise cause of the superior mildness of the former is as yet but imperfectly known.

The comparison between this disease and the cow-pox entirely fails in the circumstance of contagion; for, as has been before observed, the latter has never been observed to be communicated in this method; and therefore, too, the term natural cow-pox cannot be employed in the same distinctive sense, as when applied to the variolous infection.

It is a curious and important fact, however, that the operation of inoculating with the cow-pox virus, performed in the same method as is usually practised with that of the small-pox, appears to produce a very similar change with regard to rendering the disease more uniformly mild and favourable; though it cannot, like the other, shorten the period between the first moment of infection and the time of affecting the constitution in general, since the cow-pox in its most natural state, as it affects the milkers of diseased cattle, is really received by a kind of inoculation, though accidental.

Therefore, as some very characteristical differences in the form of the disorder depend on the mode in which the cow-pox is introduced into the human system, we may be allowed to mark that distinction by employing the term natural, or rather casual, cow-pox in the human species, to express that disease which is contracted by those who, in milking, handle the teats of an infected cow; and using the phrase inoculated cow-pox, to imply that disorder which is excited by the artificial introduction beneath the skin of some of the specific matter secreted by a cow-pox pustule, either in the cow, or more commonly in another human subject. As it is this form of the cow-pox with which the public are, and will be, the most concerned, and which will probably be adopted to assume a conspicuous place in medical nosology, there will be no great impropriety in confining to this form the term vaccine disease, which will express its origin from the cow, though probably it may never be again necessary to return to the parent stock in this animal.

In treating of this disease as communicated by inoculation, it is first necessary to show that, in this form of the disorder, all the advantages are insured which attend the casual cow-pox; and it is not difficult to prove that the disease is as much the same in these two forms, as that the natural small-pox is the same distemper as the inoculated. In the cow-pox, the course that is run by each is very similar; they each produce a general fever at a certain period, and the pustules in each equally secrete the specific virus which alone can communicate the disease to others by subsequent inoculation. What is very remarkable and unparalleled in the history of disease, is, that the cow-pox virus, after having passed through several persons, may be again commmunicated to the cow by direct inoculation in the nipples; and this again will return to the state of casual cow-pox, in the milkers who handle the udder of the animal thus diseased, which abundantly proves that the nature of the infection continues the same under these varieties. Hence we should expect that the security which the inoculated cow-pox affords against the contagion of the small-pox, (which constitutes its chief value) would be equal to that which the casual cow-pox insures, and accordingly this is confirmed by the most authentic and unequivocal testimony. From the comparatively recent date of the experiments made with the inoculated cow-pox, the authority of forty or fifty years (which the other form of the disease possesses in the dairy countries) is wanting. But as the very end of all these trials has been to prove the vaccine inoculation to be a complete preservative from the variolous contagion, and as they have been attended with entire success, there is no reason to suppose that any number of years will produce such an alteration in the constitution, as to renew the hazard of variolous contagion in any habit where it has been once completely extinguished. The uniform experience of inoculation for the small-pox, which may be recurred to by fair analogy, would contradict such a supposition. Like this latter disease, too, certain precautions are to be taken, and observations made, in order to distinguish the case of a spurious and incomplete cow-pox, from that which is perfect and genuine.

The chief differences which exist between the casual and the inoculated cow-pox are in the degree in which each affects the body. As much of the severity of the disease depends on the extent of topical ulceration, the former, by producing larger and deeper pustules, generally occasions a much severer disease; and these likewise are more liable to leave deep and extensive sores, long after the eruptive fever is subsided, which are difficult to heal. Another difference between the two forms of this disease is in the appearance of the pustules. Those which are formed by immediate infection from the cow are more prominent, and have a blueish cast, which is very characteristic. This particularly happens in the casual disease, though it is also retained in the first inoculation from the cow, but is undistinguishably lost after it has passed through one generation (if it may be so called) in the human subject.

There are several important circumstances belonging to vaccine inoculation, which deserve the attention of the medical practitioner, and which require to be given in detail with that minute and circumstantial description which alone is able to give assistance in directing real practice. These will be conveniently arranged under a few distinct heads.

Of the Selection of Matter. Dr. Jenner has laid down with great precision those sources of the spurious or imperfect cow-pox, that depend on the state and nature of the infecting matter employed for inoculation; and subsequent observation has proved more than ever the necessity of attending to this part of the subject. They are,

First. When the pustule that affords the matter is not the genuine specific cow-pox. This it is of great importance to be aware of, both when the disease is to be introduced immediately from the cow, and from the human subject. As we often find that almost any acrid matter from any kind of pustule, when applied by inoculation to a sound surface, will there excite inflammation and a pustule sore, a mistake as to the nature of the virus thus introduced might easily happen, and would lead to much error and false security with regard to variolous contagion. The distinguishing marks of the true disease in the cow, have been already mentioned. Those which characterise the genuine disorder in the human subject, will be afterwards enumerated.

Secondly. When the matter is genuine, and would be perfectly unexceptionable if employed on the spot, but by being kept in a manner favourable to spontaneous alteration, or preserved in a careless way, it has lost its specific properties. This will apply to infecting virus procured either from the cow or the human pustule: and from the frequent failure of matter to produce the disease, when it has been kept for a certain length of time, though with care, it seems to be probable that the vaccine virus is more liable to lose its peculiar properties than the variolous, and requires greater precautions to be preserved in sufficient activity. This circumstance, however, (that is where good and proper matter has lost by keeping its power of giving the genuine infection) is much more commonly a source of total failure produce any effect from inoculation, than of exciting a spurious pustule, provided the matter had been taken at a proper period of the disorder, and in the most unexceptionable manner.

Thirdly. When the matter has been taken from a true cow-pox pustule, but has been furnished, not by the clear limpid fluid, which forms the contents of the pustule in its earlier stages, but by the purulent matter which is to be found under the scab at that advanced stage of the disorder, when all the first fluid is dried up, and the pustule has either degenerated into a simple ulcer, or has lost its infecting properties. This particularly applies to the disease of the human subject; but both in man and in the cow, it is not very easy to fix the exact limits, when the local affection ceases to have any thing specific in its nature, and consequently to have the power of communicating the disease.

These three circumstances (in any of which a partial and therefore highly deceitful disease may be excited by spurious inoculation) will direct the practitioner in the choice of the matter which he employs.

The uniform mildness of the inoculated vaccine disease has hitherto afforded no grounds for any such distinction as good or bad, a healthy, or unhealthy sort of matter, which obtains (perhaps without foundation) in the small-pox; and no perceptible difference of quality has been ascertained, between matter procured from the inoculated pustule as soon as it begins to afford any fluid, and that which is taken just at the time when it is receding, and the scabbing process commences.

We may add, that hitherto no successive inoculations from one human subject to another have made any alteration, either in the nature of the disorder, or the appearance of the pustule after the first time of insertion from the animal; when, as has been mentioned, it retains some of the character of the casual cow-pox. Therefore, as long as the supply of vaccine virus is kept up by propagating the genuine disease through successive inoculations, there will be no occasion to return to the cow for a new parent stock.

Of the proper Subjects and Seasons for Inoculation. The vaccine disease, when properly introduced by inoculation, appears to have almost as great a superiority in point of mildness and security over the variolous inoculation, as this has over the natural small-pox: so that the same precautions which would be highly requisite in communicating the latter, (where the time can be chosen) become less so where the disorder is to be introduced by inoculation; and still less where the vaccine is substituted for the variolous disease. The experience which the inoculated cow-pox already affords, seems to show that it may be practised with great safety at any age, even from the earliest infancy. In general, we may say that similar precautions are to be used here, as with variolous inoculation, so that even the vaccine disease should be avoided during the time of teething, or any particularly unfavourable state of body; but we may assert with confidence that at any time it is preferable to running any considerable risk of the small-pox contagion.

Of the Method of performing the Inoculation. The object to be fulfilled in performing this operation is to secure the insertion of the infectious matter, with as little injury to the parts as is compatible with the end proposed. Uniform experience shows that in inoculating either with this or variolous matter, the method of making the incision is not a point of indifference; for, on the form and depth of the wound will in some measure depend the degree of violence in the subsequent inflammation. In making the puncture in the arm, we cannot follow a better method than that recommended by Dr. Woodville, who advises "that the lancet should be held nearly at a right angle with the skin, in order that the infectious fluid may gravitate to the point of the instrument; which in this direction should be made to scratch the cuticle repeatedly, until it reach the true skin, and become tinged with blood."

The most certain method of securing the infection is to inoculate whilst the matter is fluid, and fresh from the pustule; but as this is often impracticable, it is adviseable to hold the infected lancet for some time over the steam of boiling water, to soften and dissolve the hardened matter. Where the virus has been procured upon thread, the same means are to be pursued as when inoculating with variolous matter; that is, to make a small longitudinal incision upon the arm, to apply to it the infected thread, and detain it there by adhesive plaster, till the disease is communicated. This method is found to be more apt to fail than when the matter is received upon a lancet, provided it be fluid from the pustule; but dried matter will seldom long preserve its efficacy, except it be taken and kept

with particular precautions. These will be mentioned in a subsequent section.

Progress of the Disease. The progress of the vaccine inoculation, from the time of insertion to that of the drying-up of the pustule, is commonly very uniform, the different stages of the local and general affection well marked, and the successive changes occur for the most part at regular periods. The following therefore may be considered as the history of this disorder which will represent the most usual progress of the vaccine inoculation.

The first indication of the success of the operation, is a small inflamed spot at the part where the puncture has been made, which is very distinguishable about the third day. This continues to increase in size, becomes hard, and a small circular tumour is formed, rising a little above the level of the skin. About the sixth day, the centre of the tumour shows a discoloured speck, owing to the formation of a small quantity of fluid, and this continues to increase, and the pustule to fill, and become distended, till about the tenth day. At this time it shews in perfection the characteristic features which all along distinguish it from the variolous pustule. Its shape is circular, or sometimes a little oval, but the margin is always well defined, and never rough and jagged; the edges rise above the level of the skin, but the centre is depressed, and has not that plumpness which marks the small-pox pustule. As soon as the vesicle contains any fluid, it may be opened for future inoculation, and from about the third to the ninth day is found to be in its greatest activity. It should never be taken, however, after the ninth day, as after that period it is not to be depended upon.

About the eighth day, when the pustule is fully formed, the effects on the constitution begin to show themselves, the general indisposition is commonly preceded by pain at the vesicle and in the arm-pit, followed by head-ach, some shivering, loss of appetite, pain in the limbs, and a feverish increase of pulse. These continue with more or less violence for one or two days, and always subside spontaneously without leaving any unpleasant consequence. During the general indisposition, the vesicle in the arm, which had been advancing to maturity in an uniform manner becomes surrounded with a circular inflamed margin, about an inch or an inch and a half broad, and this blush is an indication that the whole system is affected; for the general indisposition (if it occurs at all) always appears on, or before, the time when the efflorescence becomes visible. After this period, the fluid in the vesicle gradually dries up, the surrounding blush becomes fainter, and in a day or two dies away imperceptibly; so that it is seldom to be distinguished after the thirteenth day from inoculation. The vesicle now no longer increases in extent, but on its surface a hard thick scab of a brown or mahogany colour is formed, which, if not pulled off, remains for nearly a fortnight, till it spontaneously falls, leaving the skin beneath perfectly sound and uninjured.

Such is the uniform progress of the disease in the greater number of cases, with only the variation of a day or two in the periods of the different changes. The successive alterations that take place in the local affection appear to be more constant, and more necessary to the success of the inoculation, than the general indisposition. With regard to this latter effect; the results are very various, very young infants often pass through the whole disease without any perceptible illness; with children it is extremely moderate; but with adults it is sometimes pretty severe for a few hours, though never in any degree dangerous; and sometimes even in these last, altogether insensible.

Among the occasional circumstances and varieties which now and then occur, and which the practitioner should be aware of, though they do not interfere with the nature of the disease itself, or render the patient at all less secure from receiving the advantages of the vaccine inoculation, are the following:

1. In a few instances a slight eruption or rash comes on round the inoculated part about the third day, which subsides spontaneously in a day or two without becoming pustular, and is entirely the effect of local irritation.

2. Sometimes, about the twelfth day, or after the general fever has ceased, the vesicle, instead of showing a disposition to scab, remains considerably inflamed, the surrounding efflorescence increases in extent, and the vesicle if not properly treated is apt to degenerate into a small purulent ulcer, which will continue long in that state, and at last become difficult to heal. This, we have seen, is much more liable to follow the casual cow-pox, than the inoculated; and in this state the matter which it secretes probably altogether loses its specific power of communicating the cow-pox by inoculation.

3. A more important variety which has been observed sometimes to occur under particular circumstances, is the formation of complete pustules, both in the neighbourhood of the inoculated part, and on other parts of the body. These pustules run a regular course similar to that formed by inoculation, and become filled with a purulent fluid, which has been sometimes found to possess the specific property of communicating the disease by insertion.

The appearance of these pustules may certainly be considered as a rare occurrence in the genuine cow-pox, and this has given rise to some difference of opinion concerning their origin.

Among the probable causes of a truly pustular eruption, we may mention two which appear to be fully ascertained.

The first is a rough and unskilful method of inoculation, where the wound is made deeper than necessary, and an insertion of the infecting matter takes place within the cellular membrane.

In this case, several pustules will often appear on different parts of the arm, and (as in the small-pox) the local affection of the inoculated part will be more liable to severe inflammation.

The second is the circumstance of the patient being exposed to the contagion of small-pox, during the time that the vaccine inoculation is making its usual progress. The large proportion of pustular eruptions, and the greater severity of the disease, that occurred during the first experiments on the vaccine inoculation at the Small-Pox Hospital, near London, are to be accounted for on this ground.

It is an important circumstance that the cause of these latter pustular cases is now fully cleared up. The vaccine inoculation, in its earlier stages, is not able to secure the patient against the contagion of the small-pox. In this it differs very essentially from the variolous inoculation; which last, it is well known, will supersede the

effects of the contagion of natural small-pox, even after the body has been exposed to it for four or five days. Therefore, when a person inoculated with cow-pox matter falls in the way of small-pox contagion during the first four or five days from inoculation, each disease will make its progress in some degree separately. The inoculation will produce its proper effect on the arm, whilst the small-pox contagion will occasion the pustules in other parts of the body. The matter, however, taken from the inoculated vaccine vesicle has no disposition to produce pustular cases, and therefore under any other circumstances there is no reason to apprehend a mixture of variolous infection. It may likewise be remarked, that when the two diseases mix in the manner above-mentioned, the vaccine vesicle is not in general surrounded with the usual efflorescence.

Sometimes, in one or two rare cases, pustules will be formed without any assignable cause: this has happened in the inoculation of a considerable number of persons, by far the greater part of whom have not had any appearance of this symptom.

The pustules do not always come to maturity, but often dry up and disappear before they contain any notable quantity of fluid. When they do advance to suppuration, they bear a perfect resemblance to the distinct pustules which are formed in the small-pox in its most favourable state.

Medical Treatment. It is a particular recommendation of this disease, that, though much attention and discrimination be necessary in selecting the matter for inoculation, and performing this slight operation in such a manner as to insure success, and (as we shall presently mention) in ascertaining, in some doubtful cases, whether or not the infection has fully taken, very little medical care is necessary in order to conduct the patient through it with perfect safety. Much of the hazard incurred in the small-pox is owing to a larger eruption upon the skin than the constitution can support; and the degree of risk to life is in a great measure proportioned to the quantity of eruption: whereas, in the cow-pox, this system may for the most part be avoided, by guarding against some of the causes which produce it, and is seldom so severe as to give any ground for alarm.

The inoculated vaccine disease, with infants and children, is uniformly mild during the whole course from the first insertion to the scabbing process; and even in most cases is attended with so little fever as scarcely to be detected even by an attentive eye, and requires no medical treatment. Indeed, as the great object is to produce the disease in a form so perfect as to leave no doubt about its appearance, and absolutely to secure the patient from any subsequent contagion of small-pox, it seems hardly adviseable to take any measures to check the approach of fever about the eighth day, any otherwise than by preserving strictly that state of temperance which well regulated children are generally kept to during the earlier part of life. Therefore, the preparing medicines which usually make a part of the remedial process during inoculation with the small-pox, are scarcely requisite here, especially when children are the patients; except in those habits that suffer considerably at all times from any febrile attack. When the symptoms of fever are manifest, and threaten to become at all severe, a brisk purgative, such as a dose of salts, generally produces very speedy relief. This is particularly useful when the patients are adults.

In the small-pox, after the eruptive fever has subsided, the pustule formed by inoculation is apt to degenerate into a tedious sore, and even abscesses form in the arm, which, in infants, have sometimes been followed by the most serious consequences. The same cause of complaint exists in the inoculated cow-pox, but the inflammation may generally be checked without difficulty, before it proceeds to any great height.

When the efflorescence comes on around the pustule about the tenth day, and the fever has subsided, we may consider the constitution as having done with the disease for every purpose of future security; and therefore the local affection of the arm may be put an end to, as soon as it can be done conveniently. In by far the greater number of cases, the scabbing or cicatrization succeeds the vesicular process with perfect regularity. Where this happens, no application of any kind to the parts should be employed; but, when the inflammation increases, when the inoculated vesicle becomes painful and the arm stiff, the mischief that is then threatened, may, if neglected, give more trouble and indisposition than all the preceding part of the disease.

To prevent this, several local applications may be employed, all of which for the most part check the inflammation very readily, and induce the healing process.

Mercurial applications, from analogy with their known good effects in the local ulcers of the small-pox, have been tried, and with great success. The part affected should be daily dressed with common mercurial ointment, or, what is a more active preparation, the Red Precipitate of Mercury, (Hydrargyrus Nitratus Ruber) in the form of an ointment. In two or three days after using this remedy the sore generally puts on a better appearance, and becomes disposed to heal, after which a simple dressing may be employed.

In many cases, however, nothing more is necessary to check the threatening inflammation, than to keep the part constantly moistened with vinegar and water, or Goulard's extract and water, till the vesicle is dried up, and only a hard scab left.

In order to put a speedy period to the local disorder when no longer necessary, it has been recommended, by Dr. Jenner and others, to apply for a very short time some very active and corrosive solution, which may hasten the process of cicatrization, and prevent any trouble that might arise from fresh ulceration at the pustule. A drop of strong vitriolic acid taken upon the head of a probe and thus applied to the vesicle for a few seconds, and afterwards washed off; or the undiluted Goulard's extract (Aq. Lithargyri Acetati) will answer this purpose, and shorten the cure of the local disorder. It is to be observed, however, that it is only very rarely, and in unusual inflammation protracted beyond the eighth or tenth day, that we should employ any of these remedies: and we should also be aware that, as they will any time induce a premature scabbing, they would in all probability, if used too early, entirely extinguish the disease before it had rendered the constitution secure against the variolous contagion, and

thereby the end of the vaccine inoculation would be defeated.

Method of taking and preserving Matter for future Inoculation. There are few practitioners of the vaccine inoculation, who have not experienced repeated disappointments in attempting to introduce this infection, from the circumstance of the virus losing its efficacy in a very short time after having been taking from the vesicle. This certainly depends in many instances on a want of activity in the matter itself, for frequent failures have happened, even where every possible precaution has been observed, and where no great distance of time has occurred between the time of taking the matter and the attempt to inoculate the disease. And yet it has also happened, that the inoculation has succeed, with matter preserved with no unusual care, and even after having been carried across the Atlantic. A few observations may therefore be made with regard to the method of taking and preserving the infecting matter. Where the virus is to be used directly after being taken from the vesicle, nothing is so convenient for receiving it as the lancet with which the subsequent inoculation is to be performed; and it has frequently happened that this method of inoculating has succeeded, both with variolous and vaccine matter, after repeated failures from every other method. As, however, this mode cannot always be conveniently used, the matter must be allowed to dry on the substance on which it is received, and afterwards be diluted with water, that it may be sufficiently liquid for insertion. A lancet will very commonly answer the purpose in this case also, if used only a very few days after the matter has been taken; but it seems to be well-established, by repeated observation, that this method is very precarious for conveying infection to any considerable distance, or for some length of time before it is to be used. It becomes then much safer, either to moisten a piece of cotton thread in the matter fresh from the vesicle, or to receive it upon a small plate of glass, over which, when the matter is dry, another piece of equal size should be laid. In all cases the liquid virus should be suffered to dry gradually and thoroughly in a warm temperature, and then should be secured from the access of air by cementing together with sealing-wax, or some similar substance, the plates of glass, or by well closing the phial into which the thread is put. Previous to inoculating from the glass plate, the matter must first be diluted with a very minute drop of warm water, well mixed by the point of a lancet, which last should then be made to take up as much as will be necessary for inoculation, and held with the point downwards, till the fluid which is upon it has acquired rather a thicker consistence. After which, the puncture may be made in the manner already mentioned. It may be observed, that though we should avoid doing such violence to the vesicle which furnishes the matter, as to make it bleed, yet the virus itself does not seem to lose any of its infecting power, by being accidentally mixed with a drop of blood.

There is only one way of transmitting this infection from one country to another, which is still more secure than either of the above, and this is, to keep up a constant succession of vesicles by inoculation of different persons (on board of ship for instance) which may be done at all times without the least risk of any general infection, and with very slight trouble and inconvenience to the person so inoculated. As a perfect vesicle may commonly be formed, by inoculating persons who have already had the small-pox, though they are unsusceptible of any general vaccine disorder, the series of infection may be kept up, though proper subjects for the disease be wanting.

In comparing the variolous and the vaccine disease, we may observe that there are two points in which they differ very sensibly,—in the form, and contents of the vesicle. That which is formed by vaccine virus, in by far the greater number of instances, continues perfectly circular during its whole progress; at all times the edges are elevated, and the surface flat, and it does not show that prominence in the centre which arises from being quite distended with its contained fluid. The small-pox vesicle at the place of insertion, while advancing to maturation, generally becomes jagged at its edges, and the outline is rendered irregular by clusters of small pustules. These, in the end, often become confluent, and leave a sore of a much greater extent than that of any single pustule, the subsequent progress of which, as has been mentioned, is frequently the cause of much trouble, and sometimes of danger, to infants.

The inoculated cow-pox vesicle on the contrary, continues well defined through every stage; and this perhaps is the reason why it much less frequently leaves any open sore at the time when the scabbing process should come on.

The contents of the respective vesicles also differ. The fluid which the vaccine pustule secretes does not progressively change from a watery to a thick purulent matter, as in the small-pox, but continues thin and almost limpid, till it entirely disappears. It is also succeeded by a hard brown shining scab, which latter is harder, smoother, and of a darker colour than that which attends the variolous vesicle or pustule, as this last has usually and properly been called.

Where the vaccine inoculation is followed by no local disorder, or only a slight redness at the punctured part for a day or two, we can have no doubt that the operation has failed; but cases sometimes happen where the failure is equally certain, but which require much more discrimination to be distinguished from those in which the disorder is complete and genuine.

The regularity with which the local disease at the place of inoculation runs through its several stages, seems to be the principal point to be attended to; for the accession of fever is certainly not necessary to constitute the disease, since the greater number of infants have no apparent indisposition. Therefore, when the vesicle advances in a very hasty and irregular progress, when the inoculated puncture on the second or third day after insertion swells considerably, and is surrounded with an extensive redness, this premature inflammation very certainly indicates a failure in the operation. Even when the inoculation has advanced for the first few days in a regular manner, but when, about the sixth day, instead of exhibiting a well formed vesicle of fluid, the part runs an irregular festering sore, the purpose of inoculation is equally defeated; and these varieties require to be watched with an attentive and experienced eye, since they might readily lead to a false, and per-

haps fatal idea of security against any subsequent exposure to a variolous contagion.

Obstructions to the general adoption of Vaccination. It is a curious and extraordinary fact, that incalculable as is the advantage likely to be derived from the discovery of cow-pox inoculation, it has met with more general opposition in England, the country to which the discovery owes its birth, than in any other country in the world; and this both from the public and from medical practitioners, and notwithstanding that the science has been followed up by its advocates with the most scrupulous vigilance of observation, and certainly with no lack of their promises and predictions. This opposition, however, has not always been illiberal nor illaudable, nor will the warmest friend to vaccination have any reason, in the issue, to regret that it has been exposed to so severe a discipline. We shall state a few of these causes which, in our opinion, have contributed most powerfully to excite so extraordinary a resistance.

The first and most obvious cause is the very natural aversion which mankind will always feel to the reception of any disease from the brute creation, even though it should, as in the present instance, be proposed as a most advantageous prophylactic. The arms of philosophy, of physiology, and of medical ratiocination, may indeed be advanced against such an opinion, but they will for a long time be advanced in vain; and the abhorrence will be always found the most violent, and hence, perhaps, the prejudice become the deepest rooted, in the country and among the people where the recommendation is first started; distant, and even adjoining nations become acquainted with the invention by rumour alone; they have nothing to do with the practice; they reason upon the subject as a matter of mere speculation, and one which is never likely to touch themselves; hence their passions are much less deeply engaged in the contest, and they are progressively and imperceptibly to receive it with less repugnance when at length its unexpected spread shall have propagated it into their own regions.

There can be no doubt that this natural aversion has, among ourselves, been very considerably augmented by the industry of professional enemies to the invention; some of whom, from the purest motives, and others from the most contemptible and self-interested, have taken advantage of the public prejudice, and revived every argument against the introduction of the cow-pox which was formerly started against that of small-pox inoculation. Such, more especially as the utter want of security, a chance of as great a severity of disease, and even of mortality, and most of all the certainty of destroying the constitution by slowly subverting the established stamina of health, or of disfiguring the face and other parts of the body by exciting tumours of the most disgusting and monstrous appearance. All this battery of artillery has been played off, and played off with too much success; but the reign of terror has had its day; and upon these points at least we believe the passions of our countrymen are beginning to subside; passions roused to a higher pitch than in any other quarter, from the mere fact that here the discovery commenced, here the contest was first started, and here we are in the habit of exercising a much greater latitude of thinking for ourselves than in any other country in the world. This apology we think due to the general vehemence which was at first manifested in England upon the appearance of this most important discovery. Even in India, notwithstanding the great veneration in which the gentle and harmless animal, which furnishes to us the source of security, is universally held, a repugnance to participate in one of its diseases, was evinced in a degree nearly equal to that which sprung up among ourselves. "The circumstance of its coming from the cow," observes Mr. Shoolbred, "so far from operating as was at first expected, in its favour, has directly the contrary effect; and the great body of the natives, the labouring class, are absolutely so stupid and insensible, as to have no perception of its inestimable value to mankind." *Report on the Progress of Vaccine Inoculation in Bengal.*

Another source of opposition may be referred to the history of the cow-pox virus as at first introduced before the public; the mistakes which were committed in the earliest infancy of the practice, and the apparent indecision which, on this account, resulted from it.

The disease of the cow-pox was first introduced by Dr. Jenner, as originating from the fetid ichor discharged from the heels of horses affected with the grease; and the abhorrence to a voluntary reception of it, which was sure to be very great and extensive, without such a theory attached to it, was hereby quadrupled in every respect; and it has, perhaps, been one of the most favourable circumstances to the suppression of much of that general and utter odium with which cow-pox inoculation was at first received, that subsequent inquiries and arguments have succeeded in proving pretty effectually, that here at least the ingenious discoverer was deceived in his conjectures. The virus of both diseases may perhaps be a prophylactic against the small-pox, but in themselves they now appear to be distinct and unconnected maladies.

The mistakes at first committed, during the infancy of the practice, and the conflicting or unsettled opinions upon particular points connected with it, were also highly adverse to its promotion. It was generally conceived at an early period, that the power of the cow-pox virus for fresh inoculations, was commensurate with the progress of the local inflammation, and consequently that it was in its most active state from the eighth or ninth day after inoculation to the thirteenth or fourteenth; it is now sufficiently ascertained, however, that it is only in a state of prophylactic activity from about the third day to the eighth or ninth, and that after this period, notwithstanding the increased spread, and deeper blush of the areola, it is become to all preventive purposes effeté and useless; and to this cause we have to ascribe a subsequent appearance of small-pox in a great variety of cases upon those who were the earliest subjects of vaccine inoculation. It was a circumstance equally hostile to its general reception, that soon after the introduction of the vaccine matter into the Small-Pox Inoculation Hospital, from not carefully keeping this matter separate from the matter of small-pox, the two discharges became intermixed, and were employed in a great variety of instances in this state in the metropolis, as well as sent to a great variety of quarters in the country: hence a disease was produced, as the result of what should have been genuine cow-pox inoculation, far more violent in its symptoms than it ought to have been, and ac-

companied with a pustulous eruption all over the body, equally new and extraordinary.

It was long before this unfortunate mistake was discovered; and when at length this point was settled, a difference of professional opinion started up concerning the disease and the consequent eruptions which were produced by this intermixed matter; a disease less severe than the small-pox, as it usually occurs even after inoculation, and eruptions filled with a fluid of a more imperfect concoction than variolous pus in its usual state, and of a more temporary duration. It was at first conceived that this was a hybrid disease, formed by an union of two distinct morbid actions; the opinion was unphilosophical, because contrary to general analogy, and might have lain the foundation of hypotheses which would have been altogether destructive to the new practice: it was, nevertheless, at first widely embraced, and warmly supported; till at length better arguments and additional experience proved abundantly, that by such an union of the two distinct matters, the two consequent actions did not unite, but that each disease ran through its own separate round at the same time, the variolous effect alone being in some degree mitigated, and merely changed in consequence of such mitigation by the co-existence of a rival action.

There were various other circumstances that contributed in no small degree at first, and still operate in a considerable measure to retard a general adoption of vaccine inoculation. The cases of small-pox after vaccination have been very numerous in the whole; there can be little doubt that the greater number of these have proceeded from imperfect vaccination of some kind or other; there are many, however, which it is impossible to ascribe to this cause; many in which there can be no doubt of the vaccination having been perfect and genuine, and upon which, nevertheless, small-pox has supervened upon a casual exposure to its effluvia. Of the cause of this failure we are ignorant to the present hour; it is the fashion, and it is a fashion founded on rational principles, and supported by similar facts in the case of small-pox, to ascribe such failures to *peculiarity* of constitution, by which the system is rendered inflexible to the general prophylactic; but to this hour we know nothing of the nature of this peculiarity, and are consequently altogether incapable of guarding against it.

There is to this moment also, an indecision of opinion and an impreciseness of language too frequently discoverable in the conversation and remarks of many of the ablest and warmest advocates for vaccination, which cannot fail to have produced and prolonged a considerable degree of prejudice against it; and that we may not be accused of advancing accusations without proof, we shall specify a few instances from the examinations which took place before the committee of the house of commons. Mr. Croft and various other witnesses delivered it as their opinion that no constitutional affection was necessary, "provided the arm had gone through the usual progress." Dr. Liston, Mr. Keats, and Dr. Skey, seemed to think a constitutional affection of some degree or other always and absolutely necessary. Sir W. Farquhar and Dr. Skey give it as their opinion, that vaccine inoculation will supersede small-pox, the former being applied to the system within a day or two after the latter. Dr. Ash and the reverend G. C. Jenner affirm, that it does not supersede small-pox. Mr. Cline asserts that it does not supersede it, but produces a milder disease. Dr. Nelson thinks that it produces no effect whatever. Mr. Knight "does not think it easy to distinguish the true from the spurious pustule, excepting by experience." Dr. Marshall "thinks it easily distinguishable, and that a person who has once seen the true cow-pox pustule, can never be mistaken." The term spurious disease, moreover, upon which so many pages and pamphlets have been written, is understood in a different sense by different witnesses, and hence another, and extensive source of difficulty. "The spurious kind of vaccine inoculation," says Mr. Knight, "arises as far as I know from the matter being taken *in too advanced a period* of the pustule, as it here seems to be decomposed, and no longer to retain its specific poison." To the same question, "can you state from what source the spurious cases of cow-pox arose?" Mr. Addington replies, "In some instances, I believe, from the matter being taken at *too late a period of the disease*; in others from changes which it had *undergone during its preservation*, and in others from the *modes of inoculation employed*; hereby giving us three distinct sources of spurious cow-pox: one of which only is admitted by Mr. Knight. Dr. Blane, on the contrary, and apparently with more accuracy denominates the disease resulting from effetè matter, or that taken at too late a period a *degenerate* cow-pox; while he applies the term *spurious* to a distinct and altogether different disease, found occasionally to exist on the cow's teats, and which, as Dr. Jenner had previously observed, has casually been mistaken for the true vaccine virus. We cannot avoid observing also, that not only in the course of the examination in question, but too generally in the writings of all the advocates for cow-pox inoculation, the term *pustule* is confounded with that of *vesicle*, or rather that the former is frequently made use of while the writer is, by the very course of his argument, endeavouring to prove the non-existence of *pus* or matter of a *purulent* nature in any part of the local inflammation.

The last source of delay we shall point out, results from the very steps which have been taken, and from the most beneficial purposes, but not always with sufficient prudence, to carry vaccination into effect. Prompted by a benevolent enthusiasm, many of its most valuable advocates have so ardently and suppliantly intreated the poor to permit them to inoculate their children, that it has been impossible for these people not to conceive that the petitioners had some sinister views in their application; while others of less flexible materials have proposed a direct interposition of the legislature to compel the unruly to obedience. Who does not perceive that each of these measures, opposite as they are in their extremes, is equally calculated to prevent a general and cordial reception of vaccination?

Amidst the steps pursued for the purpose of promoting this valuable discovery, and which have equally tended to retard it, we cannot avoid mentioning the violent contests which have ensued not only between the vaccinists and the anti-vaccinists, and the intemperate and even disgraceful language which has too often been exhibited on both sides, but between the different public establishments for vaccinating. Into these disputes it would be equally unpleasant and invidious to enter; and we shall only add, that from all of them, the original discoverer appears to us to

have kept aloof with a dignity and forbearance that do equal credit to his heart and to his head, and that cannot fail to throw around him an additional lustre to that with which his first happy discovery, and his subsequent and indefatigable labours have so gloriously irradiated him.

After all, what would have been the result if this valuable fact had been left to its own merits at large, or if even at present it were to be left to its own merits, equally without public patronage or legislative interposition? Our own opinion is, in regard to this as to every thing else of real excellence, that it would be sure to find its level in the upshot; and to maintain its fair and marketable value. We have no doubt that its own beneficial effects must necessarily in the end have secured it a victory over every enemy; and that it has been nursed into a state of sickliness and fractiousness by indulgence and patronage. Nothing of the kind was necessary to give a triumph to variolous inoculation; it made its way by the force of its own intrinsic worth; it conquered by the weapons of truth and reason alone. We are convinced, that in the end, vaccination would have triumphed by the same means, and we are confident that the violence of its injudicious friends have proved of more disservice to it than a host of open and undisguised enemies.

Upon a subject of so much importance, it would be highly blameable to close this article without glancing at the concurrent testimonies in favour of vaccination, which have been presented to the legislature from the chief professional colleges and incorporations of the united kingdom, in consequence of his majesty's commands to these respective bodies to make a report upon the subject. Upon a grave and adequate investigation of all these, however, we can only copy the following from the Royal College of London; and we do it from a thorough conviction that it will go further towards quieting the alarms of the timid, and settling the scepticisms of the doubtful, than volumes directed to the same end from the pen of a partizan:

"The Royal College of Physicians of London, having received his majesty's commands, in compliance with an Address from the House of Commons, 'to inquire into the state of Vaccine Inoculation in the united kingdom, to report their opinion and observations upon that practice, upon the evidence which has been adduced in its support, and upon the causes which have hitherto retarded its general adoption;' have applied themselves diligently to the business referred to them.

"Deeply impressed with the importance of an inquiry which equally involves the lives of individuals, and the public prosperity, they have made every exertion to investigate the subject fully and impartially. In aid of the knowledge and experience of the members or their own body, they have applied separately to each of the licentiates of the college; they have corresponded with the Colleges of Physicians of Dublin and Edinburgh; with the Colleges of Surgeons of London, Edinburgh, and Dublin; they have called upon the societies established for vaccination, for an account of their practice, to what extent it has been carried on, and what has been the result of their experience; and they have, by public notice, invited individuals to contribute whatever information they had severally collected. They have in consequence been furnished with a mass of evidence communicated with the greates readiness and candour, which enables them to speak with confidence upon all the principal points referred to them.

"1. During eight years which have elapsed since Dr. Jenner made his discovery public, the progress of vaccination has been rapid, not only in all parts of the united kingdom, but in every quarter of the civilized world. In the British islands some hundred thousands have been vaccinated, in our possessions in the East Indies upwards of eight hundred thousand, and among the nations of Europe the practice has become general. Professional men have submitted it to the fairest trials, and the public have, for the most part, received it without prejudice. A few indeed have stood forth the adversaries of vaccination, on the same grounds as their predecessors who opposed the inoculation for the small-pox, falsely led by hypothetical reasoning in the investigation of a subject which must be supported or rejected, upon facts and observation only. With these few exceptions, the testimony in favour of vaccination has been most strong and satisfactory, and the practice of it, though it has received a check in some quarters, appears still to be upon the increase in most parts of the united kingdom.

"2. The College of Physicians in giving their observations and opinions on the practice of vaccination, think it right to premise, that they advance nothing but what is supported by the multiplied and unequivocal evidence which has been brought before them, and they have not considered any facts as proved but what have been stated from actual observation.

"Vaccination appears to be in general perfectly safe; the instances to the contrary being extremely rare. The disease excited by it is slight, and seldom prevent those under it from following their ordinary occupations. It has been communicated with safety to pregnant women, to children during dentition, and in their earliest infancy; in all which respects it possesses material advantages over inoculation for the small-pox; which, though productive of at disease generally mild, yet sometimes occasions alarming symptoms, and is in a few cases fatal.

"The security derived from vaccination against the small pox, if not absolutely perfect, is as nearly so as can perhaps be expected from any human discovery; for amongst several hundred thousand cases, with the results of which the college have been made acquainted, the number of alleged failures has been surprisingly small, so much so, as to form certainly no reasonable objection to the general adoption of vaccination; for it appears that there are not nearly so many failures, in a given number of vaccinated persons, as there are deaths in an equal number of persons inoculated for the small-pox. Nothing can more clearly demonstrate the superiority of vaccination over the inoculation of the small-pox, than this consideration; and it is a most important fact, which has been confirmed in the course of this inquiry, that in almost every case, where the small-pox has succeeded vaccination, whether by inoculation or by casual infection, the disease has varied much from its ordinary course; it has neither been the same in the violence, nor in the duration of its symptoms, but has, with very few exceptions, been remarkably mild, as if the small-pox had been deprived,

by the previous vaccine disease, of all its usual malignity.

"The testimonies before the College of Physicians are very decided in declaring, that vaccination does less mischief to the constitution, and less frequently gives rise to other diseases, than the small-pox, either natural or inoculated. The college feel themselves called upon to state this strongly, because it has been objected to vaccination, that it produces new, unheard of, and monstrous diseases. Of such assertions no proofs have been produced, and, after diligent inquiry, the college believe them to have been either the inventions of designing, or the mistakes of ignorant men. In these respects then, in its mildness, its safety, and its consequences, the individual may look for the peculiar advantages of vaccination. The benefits which flow from it to society are infinitely more considerable; it spreads no infection, and can be communicated only by inoculation. It is from a consideration of the pernicious effects of the small-pox, that the real value of vaccination is to be estimated. The natural small-pox has been supposed to destroy a sixth part of all whom it attacks; and that even by inoculation, where that has been general in parishes and towns, about one in three hundred has usually died. It is not sufficiently known, or not adverted to, that nearly one-tenth, some years more than one-tenth of the whole mortality in London, is occasioned by the small-pox; and however beneficial the inoculation of the small-pox may have been to individuals, it appears to have kept up a constant source of contagion, which has been the means of increasing the number of deaths by what is called the natural disease. It cannot be doubted that this mischief has been extended by the inconsiderate manner in which great numbers of persons, even since the introduction of vaccination, are still every year inoculated with the small-pox, and afterwards required to attend two or three times a week at the place of inoculation, through every stage of their illness.

"From this, then, the public are to expect the great and uncontroverted superiority of vaccination, that it communicates no casual infection, and, while it is a protection to the individual, it is not prejudicial to the public.

"3. The College of Physicians, in reporting their observations and opinions on the evidence adduced in support of vaccination, feel themselves authorized to state that a body of evidence so large, so temperate, and so consistent, was perhaps never before collected upon any medical question. A discovery so novel, and to which there was nothing analogous known in nature, though resting on the experimental observations of the inventor, was at first received with diffidence: it was not, however, difficult for others to repeat his experiments, by which the truth of his observations were confirmed, and the doubts of the cautious were gradually dispelled by extensive experience. At the commencement of of the practice, almost all that were vaccinated were afterwards submitted to the inoculation of the small-pox; many underwent this operation a second, and even a third time, and the uniform success of these trials quickly bred confidence in the new discovery. But the evidence of the security derived from vaccination against the small-pox does not rest alone upon those who afterwards underwent variolous inoculation, although amounting to many thousands; for it appears, from numerous observations communicated to the college, that those who have been vaccinated are equally secure against the contagion of epidemic small-pox. Towns indeed, and districts of the country, in which vaccination had been general, have afterwards had the small-pox prevalent on all sides of them without suffering from the contagion. There are also in the evidence a few examples of epidemic small-pox having been subdued by a general vaccination. It will not, therefore, appear extraordinary that many who have communicated their observations should state, that though at first they thought unfavourably of the practice, experience had now removed all their doubts.

"It has been already mentioned, that the evidence is not universally favourable, although it is in truth nearly so, for there are a few who entertain sentiments differing widely from those of the great majority of their brethren. The college, therefore, deemed it their duty in a particular manner, to inquire upon what grounds and evidence the opposers of vaccination rested their opinions. From personal examination, as well as from their writings, they endeavoured to learn the full extent and weight of their objections. They found them without experience in vaccination, supporting their opinions by hearsay information, and hypothetical reasoning, and, upon investigating the facts which they advanced, they found them to be either misapprehended or misrepresented; or that they fell under the description of cases of imperfect small-pox, before noticed, and which the college have endeavoured fairly to appretiate.

"The practice of vaccination is but of eight years standing, and its promoters, as well as opponents, must keep in mind, that a period so short is too limited to ascertain every point, or to bring the art to that perfection of which it may be capable. The truth of this will readily be admitted by those acquainted with the history of innoculation for the small-pox. Vaccination is now, however, well understood, and its character accurately described. Some deviations from the usual course have occasionally occurred, which the author of the practice has called spurious cow-pox, by which the public have been misled, as if there were a true and false cow-pox; but it appears, that nothing more was meant, than to express irregularity or differeuce from that common form and progress of the vaccine pustule from which its efficacy is inferred. Those who perform vaccination ought therefore to be well instructed, and should have watched with the greatest care the regular progress of the pustule, and learnt the most proper time for taking the matter. There is little doubt that some of the failures are to be imputed to the inexperience of the early vaccinators, and it is not unreasonable to expect that farther observation will yet suggest many improvements that will reduce the number of anomalous cases, and furnish the means of determining, with greater precision, when the vaccine disease has been effectually received.

"Though the college of physicians have confined themselves in estimating the evidence to such facts as have occurred in their own country, because the accuracy of them could best be ascertained, they cannot be insensible to the confirmation these receive from the reports of the successful introduction of vaccination, not only

into every part of Europe, but throughout the vast continents of Asia and America.

"IV. Several causes have had a partial operation in retarding the general adoption of vaccination; some writers have greatly undervalued the security it affords, while others have considered it to be of a temporary nature only; but if any reliance is to be placed on the statements which have been laid before the college, its power of protecting the human body from the small-pox, though not perfect indeed, is abundantly sufficient to recommend it to the prudent and dispassionate, especially as the small-pox, in the few instances where it has subsequently occurred, has been generally mild and transient. The opinion that vaccination affords but a temporary security is supported by no analogy in nature, nor by the facts which have hitherto occurred. Although the experience of vaccine inoculation be only of a few years, yet the same disease, contracted by the milkers of cows, in some districts has been long enough known to ascertain that in them, at least the unsusceptibility of the small-pox contagion does not wear out by time. Another cause, is, the charge against vaccination of producing various new diseases of frightful and monstrous appearance.

"Representations of some of these have been exhibited in prints in a way to alarm the feelings of parents, and to infuse dread and apprehension into the minds of the uninformed. Publications with such representations have been widely circulated, and though they originate either in gross ignorance, or wilful misrepresentation, yet have they lessened the confidence of many, particularly of the lower classes, in vaccination; no permanent effects, however, in retarding the progress of vaccination, need be apprehended from such causes, for, as soon as the public shall view them coolly and without surprize, they will excite contempt and not fear.

"Though the college of physicians are of opinion that the progress of vaccination has been retarded in a few places by the above causes, yet they conceive that its general adoption has been prevented by causes far more powerful, and of a nature wholly different. The lower orders of society can hardly be induced to adopt precautions against evils which may be at a distance; nor can it be expected from them, if these precautions are attended with expense. Unless therefore, from the immediate dread of epidemic small-pox, neither vaccination nor innoculation appear at any time to have been general, and when the cause of terror has passed by, the public have relapsed again into a state of indifference and apathy, and the salutary practice has come to a stand, it is not easy to suggest a remedy for an evil so deeply imprinted in human nature. To inform and instruct the public mind may do much, and it will probably be found that the progress of vaccination in different parts of the united kingdom will be in proportion to that instruction. Were encouragement given to vaccination, by offering it to the poorer classes without expense, there is little doubt but it would in time supersede the innoculation for the small-pox, and thereby various sources of variolous infection would be cut off; but till vaccination becomes general, it will be impossible to prevent the constant recurrence of the natural small-pox by means of those who are inoculated, except it should appear proper to the legislature to adopt, in its wisdom, some measure by which those who still, from terror or prejudice, prefer the small-pox to the vaccine disease, may, in thus consulting the gratification of their own feelings, be prevented from doing mischief to their neighbours.

"From the whole of the above considerations, the college of physicians feel it their duty strongly to recommend the practice of vaccination. They have been led to this conclusion by no preconceived opinion, but by the most unbiassed judgment, formed from an irresistable weight of evidence which has been laid before them. For when the number, the respectability, the disinterestedness, and the extensive experience of its advocates, is compared with the feeble and imperfect testimonies of its few opposers; and when it is considered that many, who were once adverse to vaccination, have been convinced by further trials, and are now to be ranked among its warmest supporters, the truth seems to be established as firmly as the nature of such a question admits; so that the college of physicians conceive that the public may reasonably look forward with some degree of hope to the time when all opposition shall cease, and the general concurrence of mankind shall at length be able to put an end to the ravages at least, if not to the existence, of the small-pox.

LUCAS PEPYS, President.

Royal College of Physicians,
10th April, 1807.

J. Hervey, Register.

To this report is subjoined an appendix consisting of letters to the college from the king and queen's college of physicians in Ireland; from the royal college of physicians of Edinburgh; from the royal college of surgeons of London, the royal college of surgeons of Edinburgh; and the royal college of surgeons of Dublin, adverted to in the commencement of this report, and all, in various forms, corroborating the testimony which it had been able to afford from an extensive investigation at home, and settling the question upon an impregnable basis.

INOCULATION, VEGETABLE. This, as we have already observed, consists in inserting the bud of one species of a plant into the stock of another species, both being of the same genus.

The proper season for this process is from the middle of June till the middle of August, according to the forwardness of the season, and the particular sorts of trees to be increased: the exact period, however, may be easily ascertained by trying whether the buds may be easily separated from the wood. The rule commonly attended to upon this subject is to examine whether the buds are formed at the extremity of the same year's shoots, which is a sign of their having completed their vernal growth. The first sort commonly inoculated is the apricot, and the last the orange-tree, which should never be touched till the middle of August. In performing the operation, choice should be made of cloudy weather; since when performed in the middle of the day in very hot weather, and a bright sky, the shoots perspire so fast as to leave the buds destitute of moisture: nor should the cuttings be taken off from the trees long before they are used: if brought from any considerable distance, the leaves should be cut off, but all the footstalks left, and then wrapped up in wet moss, and put into a tin box to exclude the external air. It is also an improper practice to throw the cuttings into water: as the buds become hereby

so saturated with moisture, that they no longer have any power of imbibing the sap of the stock, and hence often miscarry and disappoint the operator's hopes.

Mr. Forsyth remarks that when pear-trees grafted in the spring have not taken, they should be cut off a little below the graft at a joint or bud. The tree then throws out a great number of healthy shoots, all of which should be rubbed off, except so many as are sufficient to fill the wall; nailing them up to prevent the wind from breaking them. About the latter end of July the shoots will be fit to inoculate, which should then be done, leaving a little of the wood on the inside of the bud when inserted into the stock, and rubbing in some of the composition at the time of tyeing on the bass.

Having grafted some summer bonchretiens with the bergamot de pasque (Easter bergamot) and pear d'auch, in the spring, most of them failed, Mr. Forsyth cut them off below the graft, and in July following they had produced shoots from five to six feet long, which he inoculated in the latter end of the month from the sorts just mentioned, and all of which took. About the beginning of September he ordered the bases to be slackened; which being left too loose, the barks began to separate. He then tightened them and let them so remain till the following spring. About the beginning of April, when he saw the buds begin to shoot, he cut the shoots off near the buds; but finding many where the bark had not united, and some of the eyes apparently dead, he took a sharp pen-knife, and cut out all the decayed bark, rubbing in some of his composition, in the liquid state, till the hollow parts were filled up; he then smoothed it off with his finger even with the bark of the stock. He also rubbed some of the composition over those eyes that were in the worst state, being quite black; but with very little hope of recovery. To his great astonishment many of those which seemed perfectly dead, recovered, and by the middle of July had shoots from five to six feet long (many of the shoots which took well having fruit-buds formed for next year) and covered a space of wall longer than a young tree would have done in eight years. All the cavities from which he cut out the dead bark, and applied the composition, were, in the course of the summer, filled up with sound wood, and the bark between the stocks and grafts perfectly united.

Six years ago, he inoculated some brown beurrés and crassanes with the the pear d'auch, one of which three years afterwards covered a wall of sixteen feet high and fifteen long, and had more fruit on it that year than a maiden tree would have produced twenty years after planting. But he never recommends inoculating or grafting of old trees, except when bad sorts or more of any sort is wanted for a supply: in which last case he inclines to inoculate or graft with the pear d'auch, colmans, and winter bonchrêtiens, which keep much longer than beurrés, crassanes, &c.

For standards that have been grafted in the spring and have missed, he advises that they should be cut below the graft; as, when so treated, they throw out a great number of shoots, which ought not to be thinned very soon; as, in such cases they will be liable to be broken by the wind. The weakest shoots may be began to be taken off about the latter end of May, or the beginning of June. About the middle of the latter month they will have acquired considerable strength: then thin them; leaving as many strong regular shoots, and of those nearest the top of the stem, as will form a handsome head. If the stem be very strong it will be necessary perhaps to leave more than are intended to be inoculated, on purpose to receive the sap, which will flow in great abundance from a large trunk, and without this precaution, be apt to burst the shoots. Mr. Forsyth asserts that he has often seen shoots as large as his arm burst by a superabundance of sap. When that is likely to happen, the best plan is to scarify the shoots, and rub a little of his composition into the wounds.

Inoculation is practised upon all the tribe of fruit-trees with drupes or stone-fruits; as nectarines, peaches, apricots, plums and cherries. It is also frequently applied to oranges and jasmines; and upon the whole is generally preferable either to simple grafting or marching. It is performed as follows. Having taken off the cutting from the tree to be propagated, choose a smooth part of the stock about five or six inches above the surface of the ground, if designed for dwarfs: but if for standards about six feet above the surface; then with a knife make an horizontal cut across the rind of the stock, and from the middle of that cut make a slit downwards, about two inches in length, so that it may be in the form of a T; but be careful not to cut too deep, lest you wound the stock; then having divided the leaf from the bud, with the foot stalk remaining, make a cross cut, about half an inch below the eye, and with your knife slit off the bud, with part of the wood to it: this done, with your knife pull off that part of the wood which was taken with the bud, observing whether the eye of the bud be left to it or not; for all those buds which lose their eyes in stripping, are worth nothing: then having gently raised the bark of the stock with the flat side of your penknife clear to the wood, thrust in the bud, observing to place it smooth between the rind and wood of the stock, and cutting off any part of the rind appertaining to the bud, that may be too long for the slit in the stock; when having exactly fitted the bud to the stock, tie them closely round with bass-mat, beginning at the under part of the slit, and proceeding to the top, taking care not to bind round the eye of the bud, which should be left open.

When the bud has been inoculated three weeks or a month, if fresh and plump, it has certainly joined; at this time therefore loosen the bandage, which if it be not done soon, will injure if not destroy the bud. The March following cut off the stock obliquely about three inches above the bud, and to what is left fasten the shoot which proceeds from the bud: but this must continue no longer than one year; after which the stock must be cut off close above the bud.

INOCULA'TOR. *s.* (from *inoculate.*) 1. One that practises the inoculation of trees. 2. One who propagates the smallpox by inoculation (*Freind*).

INO'DORATE. *a.* (*in* and *odoratus*, Lat.) Having no scent (*Bacon*).

INO'DOROUS. *a.* (*inodorus*, Lat.) Wanting scent; not affecting the nose (*Arbuthnot*).

INOFFE'NSIVE. (*in* and *offensive.*) 1. Giving no scandal; giving no provocation (*Fleetwood*). 2. Giving no uneasiness; causing no terrour. 3. Harmless; hurtless; innocent (*Milton*). 4. Unembarrassed; without stop or obstruction (*Milton*).

INOFFE'NSIVELY. *ad.* Without appearance of harm; without harm.

INOFFE'NSIVENESS. *s.* (from *inoffensive.*) Harmlessness.

INOFFI'CIOUS. *a.* (*in* and *officious.*) Not civil; not attentive to the accommodation of others.

INO'LITHUS. Inolith. In mineralogy, a genus of the class earths, order calcareous. Consisting of carbonat of lime, carbonic acid gass, and a little iron; entirely soluble in nitric acid with effervescence; fibrous, parasytic, soft, lightish, breaking into indeterminate fragments. Four species:

1. I. filamentosus. Alabastrite. Fibrous limestone of Kirwan. Satin spar of Sowerby. Fibres parallel, or transverse: the first found in Russia, Poland, Germany, Saxony and Bohemia, with the fibres straight or a little curved. The second, which is that more commonly called satin-spar, found about a mile from Alston in Cumberland, washed by the river Tyne, near the level of its bed; colour white, with sometimes a rosy tinge from a diluted mixture of oxyd of iron, and transmits light through the edges or in thinner pieces; fracture in the direction of the striæ fibrous, straight or curved.

2. I. acerosus. With fascicled fibres. Found at Schemniz in Hungary, white or yellowish, yellow, yellow-brown, or flesh-colour.

3. I. stellaris. With stellate fibres, of a common figure. Found in calcareous mountains in Germany, and in the mines of Bohemia, and Hungary, white, sometimes yellowish or cinereous.

4. I. flos ferri. Ramulous, with stellate fibres. Found in the iron mines of Heidenheim in Wirtemberg, in Styermarch, Carinthia and Hungary, sometimes mixed with iron, but more frequently upon iron stone; generally snowy, sometimes yellowish.

INO'PINATE. *a.* (*inopinatus*, Lat. *inopiné*, Fr.) Not expected.

INOPPORTU'NE. *a.* (*inopportunus*, Lat.) Unseasonable; inconvenient.

INORDINACY. *s.* (from *inordinate.*) Irregularity; disorder (*Gov. of Tongue*).

INORDINATE. *a.* (*in* and *ordinatus*, Lat.) Irregular; disorderly; deviating from right (*Milton*),

INORDINATE PROPORTION, in mathematics, is that where the order of the terms compared is disturbed, or irregular. Thus, let the three magnitudes A, B, C, and other three D, E, F, when taken two and two in a cross order have the same ratio, A : B : : E : F, and B : C : : D : E, then is A : C : : D : F. See Euc. V. 23.

INO'RDINATELY. *ad.* Irregularly; not rightly (*Taylor*).

INO'RDINATENESS. *s.* Want of regularity; intemperance of any kind.

INORDINA'TION. *s.* (from *inordinate.*) Irregularity; deviation from right (*South*).

INORGA'NICAL. *a.* (*in* and *organical.*) Void of organs or instrumental parts (*Locke*).

To INO'SCULATE. *v. n.* (*in* and *osculum*, Lat.) To unite by apposition or contact (*Derham*).

INOSCULA'TION. *s.* (from *inosculate.*) Union by conjunction of the extremities. See ANASTOMOSIS.

INOWSLADISLOW, a town of Poland, capital of Cujavia, with a fort. Lat. 52. 58. N. Lon. 18. 50 E.

I'NQUEST. *s.* (*enqueste*, Fr. *inquisitio*, Lat.) 1. Judicial enquiry or examination (*Atterbury*). 2. (In law.) The *inquest* of jurors, or by jury, is the most usual trial of all causes both civil and criminal; for in civil causes, after proof made on either side, so much as each part thinks good for himself if the doubt be in the fact, it is referred to the discretion of twelve indifferent men; and as they bring in their verdict, so judgment passes: for the judge saith, "The jury finds the fact thus; then is the law thus; and so we judge" (*Cowell*). 3. Inquiry; search; study (*South*).

INQUI'ETUDE. *s.* (*inquietude*, French.) Disturbed state; want of quiet; attack on the quiet (*Wotton*).

To I'NQUINATE. *v. a.* (*inquino*, Latin.) To pollute; to corrupt (*Brown*).

INQUINA'TION. *s.* (*inquinatio*, Latin.) Corruption; pollution (*Bacon*).

INQUI'RABLE. *a.* (from *inquire.*) That of which inquisition or inquest may be made.

To INQUI'RE. *v. n.* (*inquiro*, Latin.) 1. To ask questions; to make search; to exert curiosity on any occasion (*Swift*). 2. To make examination (*Dryden*).

To INQUI'RE *v. a.* To ask about; to seek out: as, *he* inquired *the way*.

INQUI'RER. *s.* (from *inquire.*) 1. Searcher; examiner; one curious and inquisitive (*Locke*). 2. One who interrogates; one who questions.

INQUI'RY. *s.* (from *inquire.*) 1. Interrogation; search by question (*Acts*). 2. Examination; search (*Locke*).

INQUISI'TION. *s.* (*inquisitio*, Latin.) 1. Judicial inquiry (*Taylor*). 2. Examination; discussion (*Bacon*). 3. (In law.) A manner of proceeding in matters criminal, by the office of the judge.

INQUISITION, in the church of Rome, a tribunal in several Roman Catholic countries, erected by the popes for the examination and punishment of heretics. This court was founded in the 12th century by father Dominic and his followers, who were sent by Pope Innocent III. with orders to excite the Catholic princes and people to extirpate heretics, to search into their number and quality, and to transmit a faithful account thereof to Rome. Hence they were called inquisitors; and this gave birth to the formidable tribunal of the In-

quisition, which was received in all Italy and the dominions of Spain, except the kingdom of Naples and the Low Countries.

This diabolical tribunal takes cognizance of heresy, Judaism, Mahometanism, sodomy, and polygamy; and the people stand in so much fear of it, that parents deliver up their children, husbands their wives, and masters their servants, to its officers, without daring in the least to murmur. The prisoners are kept for a long time, till they themselves turn their own accusers, and declare the cause of their imprisonment; for they are neither told their crime, nor confronted with witnesses. As soon as they are imprisoned, their friends go into mourning, and speak of them as dead, not daring to solicit their pardon, lest they should be brought in as accomplices. When there is no shadow of proof against the pretended criminal, he is discharged after suffering the most cruel tortures, a tedious and dreadful imprisonment, and the loss of the greatest part of his effects. The sentence against the prisoners is pronounced publicly, and with extraordinary solemnity. In Portugal, they erect a theatre capable of holding 3000 persons; in which they place a rich altar, and raise seats on each side in the form of an amphitheatre. There the prisoners are placed; and over-against them is a high chair, whither they are called, one by one, to hear their doom, from one of the inquisitors.

These unhappy people know what they are to suffer by the clothes they wear that day. Those who appear in their own clothes are discharged upon payment of a fine: those who have a santo benito, or strait yellow coat without sleeves, charged with St. Andrew's cross, have their lives, but forfeit all their effects; those who have the resemblance of flames, made of red serge, sewed upon their santo benito, without any cross, are pardoned, but threatened to be burnt if ever they relapse: but those who, besides these flames, have on their santo benito their own picture, surrounded with figures of devils, are condemned to expire in the flames. The inquisitors, who are ecclesiastics, do not pronounce the sentence of death; but form and read an act, in which they say, that the criminal being convicted of such a crime, by his own confession, is with much reluctance delivered to the secular power to be punished according to his demerits; and this writing they give to the seven judges who attend at the right side of the altar, who immediately pass sentence. For the conclusion of this horrid scene, see ACT OF FAITH.

The preceding account of the inquisition has been hitherto given in most of our Encyclopedias. We are happy to be able to record here, that this disgraceful engine of the Roman hierarchy exists no longer. The Holy Office, after maintaining a tiresome struggle against universal abhorrence, has at length yielded to the powerful invader of her last retreat. During Bonaparte's invasion of Spain, the inquisition received her death-blow. Those who wish for minute information respecting this subject may consult Lavallée's History of the Religious Inquisitions of Italy, Spain, and Portugal, from their Origin to the Conquest of Spain.

INQUI'SITIVE. *a.* (*inquisitus*, Lat.) Curious; busy in search; active to pry into any thing (*Watts*).

INQUI'SITIVELY. *ad.* With curiosity; with narrow scrutiny.

INQUI'SITIVENESS. *s.* Curiosity; diligence to pry into things hidden (*South*).

INQUI'SITOR. *s.* (*inquisitor*, Lat.) 1. One who examines judicially (*Dryden*). 2. An officer in the popish courts of inquisition.

To INRA'IL. *v. a.* (*in* and *rail.*) To enclose with rails (*Hooker. Gay*).

I'NROAD. *s.* (*in* and *road.*) Incursion; sudden and desultory invasion (*Clarendon*).

INSA'NABLE. *a.* (*insanabilis*, Lat.) Incurable; irremediable.

INSA'NE. *a.* (*insanus*, Latin.) 1. Mad. 2. Making mad (*Shakspeare*).

INSA'NIA. (*insania*, from *in*, not, and *sanus*, sound.) Insanity, or deranged imagination. A genus of diseases in the class neuroses and order vesaniæ, characterized by erroneous judgment from imaginary perceptions or recollections, attended with agreeable emotions in persons of a sanguine temperament.

INSANITY. See INSANIA.

INSA'TIABLE *a.* (*insatiabilis*, Lat.) Greedy beyond measure; greedy so as not to be satisfied.

INSA'TIABLENESS. *s.* Greediness not to be appeased (*King Charles*).

INSA'TIABLY. *ad.* (from *insatiable.*) With greediness not to be appeased (*South*).

INSA'TIATE. *a* (*insatiatus*, Lat.) Greedy so as not to be satisfied (*Philips*).

INSATISFA'CTION. *s.* (*in* and *satisfaction.*) Want; unsatisfied state: not in use (*Bacon*).

INSA'TURABLE. *a.* (*insaturabilis*, Lat.) Not to be glutted; not to be filled.

To INSCRI'BE. *v. a.* (*inscribo*, Latin.) 1. To write on any thing (*Pope*). 2. To mark any thing with writing: as, I *inscribed* the stone with my name. 3. To assign to a patron without a formal dedication (*Dryden*). 4. To draw a figure within another (*Creech*).

INSCRI'PTION. *s.* (*inscriptio*, Latin.) 1. Something written or engraved (*Dryden*). 2. Title (*Brown*). 3. Consignment of a book to a patron without a formal dedication.

INSCRIPTION, a title or writing affixed to any thing, to give some farther knowledge of it, or to transmit some important truth to posterity. Antiquaries are very curious in examining ancient inscriptions found on stones and other monuments of antiquity. Sanchoniathon, contemporary, as it is said, with Gideon, drew most of the memoirs whereof his history is composed from inscriptions which he found in temples and on columns, both among the Heathens and the Hebrews.

It appears, indeed, that the ancients engraved upon pillars the principles of sciences, as well as the history of the world. Those mentioned by Herodotus show, that this was the

first way of instructing people, and of transmitting histories and sciences to posterity. This is confirmed by Plato in his Hippias; wherein he says, that Pisistratus engraved on stone-pillars precepts useful for husbandmen.

INSCRU'TABLE. *a.* (*inscrutabilis*, Lat.) Unsearchable; not to be traced out by inquiry or study (*Sandys*).

To INSCU'LP. *v. a.* (*insculpo*, Latin.) To engrave; to cut (*Shakspeare*).

INSCU'LPTURE. *s.* (from *in* and *sculpture.*) Any thing engraved (*Brown*).

To INSE'AM. *v. a.* (*in* and *seam.*) To impress or mark by a seam or cicatrix (*Pope*).

INSECT. See INSECTA.

INSE'CTA. Insects. The fifth class in the Linnéan system of zoology, thus classically characterized: spiracles, lateral pores; jaws lateral; organs of sense, tongue, eyes; antennas on the head; brainless; earless; nostrilless; covering, a bony coat of mail; supporters, feet, and in some, wings; they skip on dry ground, and buz.

With respect to the shape of their bodies, though it somewhat differs from that of birds, being in general not so sharp before to cut and make way through the air, yet it is well adapted to their manner of life. The base of their bodies is not formed of bone, as in many other animals; but the hard external covering serves them for skin and bone at the same time. Their feelers, beside the use of cleaning their eyes, are a guard to them in their walk or flight. The legs and wings are well fitted for their intended service; but the latter vary so much in different insects, that Linnéus has selected this variation as the basis of their different orders, which are the following:

1. Coleoptera, or beetle tribe, which have a crustaceous clytra or shell, that shuts together, and forms a longitudinal suture down their back.

2. Hæmiptera, as in the cimex, cockroach, bug, &c. which have the upper wings half crustaceous and half membranaceous; not divided by a longitudinal suture, but incumbent on each other.

3. Lepidoptera, as the butterfly; having four wings, covered with fine scales in the form of powder.

4. Neuroptera, as the dragon-fly, May or spring-fly, &c. These have four membranaceous transparent naked wings, generally reticulated.

5. Hymenoptera, as wasps, bees, &c. have four membranaceous wings, and a tail furnished with a sting.

6. Diptera, as the common house-fly, have only two wings.

7. Aptera, as the lobster, crab, scorpion, spider, &c. have no wings. See ZOOLOGY.

The structure of the eye in many insects is a most curious piece of mechanism. The outer part is remarkably hard, to guard against injuries, and has commonly a reticular appearance, or the whole may be looked upon as an assemblage of smaller eyes; but whether they see objects multiplied before them has not yet been determined. Linnéus, and several others following him, deny the existence of a brain in these creatures. But it is certain, that at least a number of the larger kinds, as the lobster, crab, &c. have a soft substance similar to the brain, from which the optic and other nerves take their rise; besides, when this substance is irritated, the animal is thrown into convulsions: hence we may conclude, that insects have a brain as well as the other classes, although this is smaller in proportion to their bodies.

The ear has been lately discovered to be placed at the root of their antennas or feelers, and can be distinctly seen in some of the larger kinds, as the lobster.

They have a stomach, and other organs of digestion; and it is curious, that in some, as the lobster, the teeth are found to be situated in the stomach.

They have a heart and blood-vessels, and circulation is carried on in them somewhat as in the higher classes; but the blood is without red globules, or, as naturalists speak, is colourless. In the lobster, and others of the larger kind, when a piece of shell is broken, the pulsation of the heart is seen distinctly, and that sometimes for several hours after it has been laid bare.

The existence of lungs has by some been denied: but later experiments and observations shew, that no species want them, or at least something similar to them; and, in many insects, they are larger in proportion than in other animals: in most of them they lie in or near the surface of the body, and send out lateral pores or tracheæ, by which, if the animal is besmeared with oil, it is instantly suffocated.

With regard to generation, the same difference of sex exists in insects as in other animals, and they even appear more disposed to increase their species; many of them, when become perfect, seeming to be created for no other purpose than to propagate their like. Thus the silk-worm, when it arrives at its perfect moth-state, is incapable of eating, and can hardly fly; it endeavours only to propagate its species: after which the male immediately dies, and so does the female as soon as she has deposited her eggs.

Besides those of the male and female, a third sex is said to exist in some insects, which we call neuter. As these have not the distinguishing parts of either sex, they are considered as eunuchs or infertile. We know of no instance of this kind in any other class of animals; and it has only been supposed among those insects which form themselves into societies, as bees, wasps, and ants; and after all it is highly probable no hermaphrodites have as yet been discovered among insects.

Since, however, the very full discovery of M. Huber that the neuters, as they have hitherto been called, of the bee tribe, are in reality females with undeveloped female organs, we have much reason to suppose that similar dis-

coveries may yet extend to all the genera supposed to possess neuters, and that the anomaly will be completely banished from entomology. See the article BEE.

The eggs of all insects first become larves, maggots or caterpillars; then each is a pupa, chrysalis or aurelia; which apparently dying, its imago, fly, butterfly, or perfect state, succeeds. Insects lay their eggs in places most convenient for the nourishment of their young; some in water, others in flesh; some in fruit and leaves, while others make nests in the earth or in wood, and sometimes even in the hardest stone. The egg in all insects first becomes (larva) a caterpillar, or maggot; from which the next change is into (pupa), a chrysalis or aurelia, so named from its being inclosed in a golden case; and this dying, or seeming to die, the (imago) fly, or butterfly, or perfect state, succeeds: and, during each of these changes, the appearance differs wonderfully. See ENTOMOLOGY, PHYSIOLOGY and ZOOLOGY.

INSECTA'TOR. *s.* (from *insector*, Lat.) One that persecutes or harasses with pursuit.

INSE'CTILE. *a.* (from *insect.*) Having the nature of insects (*Bacon*).

INSECTO'LOGER. *s.* (*insect* and λογος.) One who studies or describes insects (*Derh.*).

INSECU'RE. *a.* (*in* and *secure.*) 1. Not secure; not confident of safety (*Tillotson*). 2. Not safe.

INSECU'RITY. *s.* (*in* and *security.*) 1. Uncertainty; want of confidence (*Brown*). 2. Want of safety; danger; hazard (*Hammond*).

INSEMINA'TION. *s.* (*insemination*, Fr.) The act of scattering seed on ground.

INSECU'TION. *s.* (*insecution*, Fr.) Pursuit: not in use (*Chapman*).

INSE'NSATE. *a.* (*insensato*, Italian.) Stupid; wanting thought; wanting sensibility (*Milton*).

INSENSIBI'LITY. *s.* (*insensibilité*, Fr.) 1. Inability to perceive (*Glanville*). 2. Stupidity; dulness of mental perception. 3. Torpor; dulness of corporal sense.

INSE'NSIBLE. *a.* (*insensible*, French.) 1. Imperceptible; not discoverable by the sense (*Newton*). 2. Slowly gradual, so as that no progress is perceived (*Dryden*). 3. Void of feeling, either mental or corporal (*Milton*). 4. Void of emotion or affection (*Dryden*).

INSE'NSIBLENESS. *s.* Absence of perception; inability to perceive (*Ray*).

INSE'NSIBLY. *ad.* (from *insensible.*) 1. Imperceptibly; in such a manner as is not discovered by the senses (*Addison*). 2. By slow degrees (*Swift*). 3. Without mental or corporal sense.

INSEPARABI'LITY. INSE'PARABLENESS. *s.* (from *inseparable.*) The quality of being such as cannot be severed or divided (*Locke*).

INSE'PARABLE. *a.* (*inseparable*, Fr. *inseparabilis*, Latin.) Not to be disjointed; united so as not to be parted (*Bacon*).

INSE'PARABLY. *ad.* (from *inseparable.*) With indissoluble union (*Bentley*).

To INSE'RT. *v. a.* (*inserer*, Fr. *insero*, *insertum*, Lat.) To place in or among other things (*Stillingfleet*).

INSE'RTION. *s.* (*insertion*, French.) 1. The act of placing any thing in or among other matter (*Arbuthnot*). 2. The thing inserted (*Broome*).

To INSE'RVE. *v. a.* (*inservio*, Latin). To be of use to an end.

INSE'RVIENT. *a.* (*inserviens*, Latin.) Conducive; of use to an end (*Brown*).

To INSHE'LL. *v. a.* (*in* and *shell.*) To hide in a shell: not used (*Shakspeare*).

To INSHI'P. *v. a.* (*in* and *ship.*) To shut in a ship; to stow; to embark: not used (*Shakspeare*).

To INSHRI'NE. *v. a.* (*in* and *shrine.*) To enclose in a shrine or precious case (*Milton*).

I'NSIDE. *s.* (*in* and *side.*) Interiour part; part within (*Addison*).

INSIDIA'TOR. *s.* (Latin.) One who lies in wait.

INSI'DIOUS. *a.* (*insidieux*, Fr. *insidiosus*, Lat.) Sly; circumventive; diligent to entrap; treacherous (*Atterbury*).

INSI'DIOUSLY. *ad.* In a sly and treacherous manner; with malicious artifice (*Gov. of the Tongue*).

I'NSIGHT. *s.* (*insicht*, Dutch.) Introspection; deep view; knowledge of the interiour parts; thorough skill in any thing (*Sidney*).

INSIGNI'FICANCE. INSIGNI'FICANCY. *s.* (*insignificance*; French.) 1. Want of meaning; unmeaning terms (*Glanville*). 2. Unimportance (*Addison*).

INSIGNI'FICANT. *a.* (*in* and *significant.*) 1. Wanting meaning; void of signification (*Blackmore*). 2. Unimportant; wanting weight; ineffectual (*South*).

INSIGNI'FICANTLY. *ad.* 1. Without meaning (*Hale*). 2. Without importance or effect.

INSINCE'RE. *a.* (*insincerus*, Latin.) 1. Not what one appears; not hearty; dissembling; unfaithful. 2. Not sound; corrupted (*Pope*).

INSINCE'RITY. *s.* (from *insincere.*) Want of truth or fidelity; dissimulation (*Broome*).

To INSI'NEW. *v. a.* (*in* and *sinew.*) To strengthen; to confirm: not used (*Shaksp.*).

INSI'NUANT. *a.* (Fr.) Having the power to gain favour (*Wotton*).

To INSI'NUATE. *v. a.* (*insinuer*, French; *insinuo*, Latin.) 1. To introduce any thing gently (*Woodward*). 2. To push gently into favour or regard (*Clarendon*). 3. To hint; to impart indirectly (*Swift*). 4. To instil; to infuse gently (*Locke*).

To INSI'NUATE. *v. n.* 1. To wheedle; to gain on the affections by gentle degrees (*Shakspeare*). 2. To steal into imperceptibly; to be conveyed insensibly (*Harvey*). 3. To enfold; to wreath; to wind (*Milton*).

INSINUA'TION. *s.* (*insinuatio*, Latin.) The power of pleasing or stealing upon the affections (*Clarendon*).

INSI'NUATIVE. *a.* (from *insinuate.*) Stealing on the affections (*Gov. of Tongue*).

INSINUATOR. *s.* (*insinuator*, Lat.) He that insinuates (*Ainsworth*).

INSI'PID. *a.* (*insipidus*, Lat.) 1. Wanting taste; wanting power of affecting the organs of gust (*Floyer*). 2. Wanting spirit; wanting pathos; flat; dull; heavy (*Dryden*).

INSIPI'DITY. INSI'PIDNESS. *s.* (*insipidité*, French; from *insipid.*) 1. Want of taste. 2. Want of life or spirit (*Pope*).

INSI'PIDLY. *ad.* (from *insipid.*) 1. Without taste. 2. Dully; without spirit (*Locke*).

INSI'PIENCE. *s.* (*insipientia*, Latin.) Folly; want of understanding.

To INSI'ST. *v. n.* (*insister*, Fr. *insisto*, Lat.) 1. To stand or rest upon (*Ray*). 2. Not to recede from terms or assertions; to persist in (*Shakspeare*). 3. To dwell upon in discourse (*Decay of Piety*).

INSI'STENT. *a.* (*insistens*, Latin.) Resting upon any thing (*Wotton*).

INSI'STURE, *s.* (from *insist.*) This word seems in *Shakspeare* to signify constancy or regularity, but is not now used.

INSI'TIENCY. *s.* (*in* and *sitio*, Lat.) Exemption from thirst (*Grew*).

INSI'TION. *s.* (*insitio*, Latin.) The insertion or ingraffment of one branch into another (*Ray*).

To INSNA'RE. *v. a.* (*in* and *snare.*) 1. To intrap; to catch in a trap, gin, or snare; to inveigle (*Fenton*). 2. To intangle in difficulties or perplexities (*Hooker*).

INSNA'RER. *s.* (from *insnare.*) He that insnares.

INSO'CIABLE. *a.* (*insociable*, French.) 1. Averse from conversation (*Shakspeare*). 2. Incapable of connexion or union (*Wotton*).

INSOBRI'ETY. *s.* (*in* and *sobriety.*) Drunkenness; want of sobriety (*Decay of Piety*).

To I'NSOLATE. *v. a.* (*insolo*, Latin.) To dry in the sun; to expose to the action of the sun.

INSOLA'TION. *s.* (*insolation*, Fr.) Exposition to the sun (*Brown*).

I'NSOLENCE. I'NSOLENCY. *s.* (*insolence*, Fr. *insolentia*, Latin.) Pride exerted in contemptuous and overbearing treatment of others; petulant contempt (*Tillotson*).

To I'NSOLENCE. *v. a.* (from the noun.) To insult. A very bad word (*King Charles*).

I'NSOLENT. *a.* (*insolent*, Fr. *insolens*, Lat.) Contemptuous of others; haughty; overbearing (*Atterbury*).

I'NSOLENTLY. *ad.* (*insolenter*, Lat.) With contempt of others; haughtily; rudely (*Addison*).

INSO'LVABLE. *a.* (*insolvable*, French.) 1. Not to be solved; not to be cleared; inextricable; such as admits of no solution, or explication (*Watts*). 2. That cannot be paid.

INSO'LUBLE. *a.* (*insoluble*, French.) 1. Not to be cleared; not to be resolved (*Hooker*). 2. Not to be dissolved or separated (*Arbuth.*).

INSO'LVENT. *a.* (*in* and *solvo*, Latin.) Unable to pay (*Smart*).

INSO'LVENCY. *s.* (from *insolvent.*) Inability to pay debts.

INSOMU'CH. *conj.* (*in so much.*) So that; to such a degree that (*Addison*).

To INSPE'CT. *v. a.* (*inspicio, inspectum*, Latin.) To look into by way of examination.

INSPE'CTION. *s.* (*inspection*, French; *inspectio*, Lat.) 1. Prying examination; narrow and close survey (*South*). 2. Superintendence; presiding care (*Bentley*).

INSPE'CTOR. *s.* (Latin.) 1. A prying examiner (*Denham*). 2. A superintendent (*Watts*).

INSPE'RSION. *s.* (*inspersio*, Lat.) A sprinkling upon (*Ainsworth*).

To INSPHE'RE. *v. a.* (*in* and *sphere.*) To place in an orb or sphere (*Milton*).

INSPI'RABLE. *a.* (from *inspire.*) Which may be drawn in with the breath; which may be infused (*Harvey*).

INSPIRATI'ON. *s.* (from *inspire.*) 1. The act of drawing in the breath (*Arbuthnot*). 2. The act of breathing into any thing. 3. Infusion of ideas into the mind by a superior power (*Denham*).

INSPIRATION, among divines, &c. implies the conveying of certain extraordinary and supernatural notices or motions into the soul, or it denotes any supernatural influence of God upon the mind of a rational creature, whereby he is formed to any degree of intellectual improvement, to which he could not, or would not, in fact have attained in his present circumstances in a natural way. Thus the prophets are said to have spoken, and the apostles to have written, by divine inspiration.

Some authors reduce the inspiration of the sacred writers to a particular care of Providence, which prevented any thing they had said from falling or coming to nought; maintaining, that they never were really inspired either with knowledge or expression. According to M. Simon, inspiration is no more than a direction of the Holy Spirit, which never permitted the sacred writers to be mistaken. It is a common opinion, that the inspiration of the Holy Spirit regards only the matter, not the style or words; and this seems to fall in with M. Simon's doctrine of direction.

Theological writers have enumerated several kinds of inspiration: such as an inspiration of superintendency, in which God does so influence and direct the mind of any person, as to keep him more secure from error in some various and complex discourse, than he would have been merely by the use of his natural faculties; plenary superintendent inspiration, which excludes any mixture of error at all from the performance so superintended; inspiration of elevation, where the faculties act in a regular, and, as it seems, in a common manner, yet are raised to an extraordinary degree, so that the composure shall, upon the whole, have more of the true sublime or pathetic, than natural

genius could have given; and inspiration of suggestion, when the use of the faculties is superseded, and God does, as it were, speak directly to the mind, making such discoveries to it as it could not otherwise have obtained, and dictating the very words in which such discoveries are to be communicated, if they are designed as a message to others. It is generally allowed that the New Testament was written by a superintendent inspiration; for without this the discourses and doctrines of Christ could not have been faithfully recorded by the evangelists and apostles: nor could they have assumed the authority of speaking the words of Christ, and evinced this authority by the actual exercise of miraculous powers: and besides, the sacred writings bear many obvious internal marks of their divine original, in the excellence of their doctrines, the spirituality and elevation of their design, the majesty and simplicity of their style, the agreement of their various parts, and their efficacy on mankind; to which may be added, that there has been in the Christian church, from its earliest ages, a constant tradition, that the sacred books were written by the extraordinary assistance of the Spirit, which must at least amount to superintendant inspiration. But it has been controverted whether this inspiration extended to every minute circumstance in their writings, so as to be in the most absolute sense plenary. Jerom, Grotius, Erasmus, Episcopius, and many others, maintain that it was not; whilst others contend, that the emphatical manner in which our Lord speaks of the agency of the Spirit upon them, and in which they themselves speak of their own writings, will justify our believing that their inspiration was plenary, unless there be very convincing evidence brought on the other side to prove that it was not: and if we allow, it is said, that there were some errors in the New Testament, as it came from the hands of the apostles, there may be great danger of subverting the main purpose and design of it; since there will be endless room to debate the importance both of facts and doctrines.

Mr. Dick, in his ingenious Essay on the Inspiration of the Holy Scriptures of the Old and New Testament, points out those writings of which the inspiration is asserted by the Christian church, and assigns reasons why a divine original is attributed to these alone: yet some ask where is the necessity for instituting the inquiry, when it is expressly asserted that "all Scripture is given by inspiration of God?" (2 Tim. iii. 16.) To this question, Mr. Dick himself very ingeniously replies, "that this assertion is not a sufficient reason why we should believe the inspiration of the Scriptures. The same claim is advanced by books, which we certainly know to have been written by wicked and designing men. According to the principles of common sense and impartial reasoning, the testimonies of the Scriptures in their own favour ought not to be admitted, any more than the testimony of any other writing concerning itself, till we see it supported by satisfactory evidence."

Though the Old Testament precedes the New, both as to time and place, Mr. Dick thinks that his purpose will be more easily and effectually accomplished by inverting this order; he therefore begins with considering the inspiration of the New Testament, adducing both the external and internal evidence. Respecting the former, he observes that the inspiration of the New Testament may be inferred from the credit which the testimony of the writers concerning Christ obtained in the course of their public ministry, and from the reception of the books of the New Testament by those to whom they were first presented; and the latter, or internal evidence, from the character of Christ therein delineated, the system of doctrine, and the prophecies which they contain.

After having brought forward his proofs for the inspiration of the New Testament, the author proceeds to the consideration of that of the Old; when he remarks that, "if the New Testament be once proved to be inspired, the inspiration of the Old Testament must be admitted without farther proof, because its books are explicitly recognized in the former as divine:' but Mr. Dick does not rest the matter on this single argument. He distinctly examines the Books of Moses, the historical books, and the prophetical.

To the examination of the Old and New Testaments, the author has subjoined what he terms "Proofs of the Inspirations of the Scriptures in general:" these are their sublimity, their piety, their purity or holiness, their efficacy, their harmony, and their miraculous preservation.

In considering the objections against the inspiration of the scriptures, this writer makes distinct replies to those arguments which are adduced from the sufficiency of the light of Nature, from the partial communication of the scriptures, from their divine authority being incapable of proof, from their supposed contradictions, from their containing doctrines mysterious and contrary to reason, from their relating things unworthy of God, and from their style not being so dignified, so elegant, and so conformable to rule, as we might expect to find it in divine writings.

We have given this summary of the procedure in Mr. Dick's Essay, because we think it suggests to the candid mind a train of argumentation, by pursuing which, perfect satisfaction may be obtained as to the divine origin of the received christian scriptures from a careful examination of them, independent of all treatises on the subject. Those, however, who are desirous to read the most valuable pieces which have been written on the point may turn to Mr. Dick's Essay; Tillotson's Sermons, vol. ii. p. 16, &c.; Chandler on Joel, p. 108, &c.; Doddridge's Lectures, Lect. 137, &c. and his Family Expositor, vol. iii. Appendix, No. 2, in which latter place there is a most ex-

cellent dissertation on the inspiration of the New Testament, as proved from the facts recorded in its historical books.

To INSPI'RE. *v. n.* (*inspiro*, Latin.) To draw in the breath (*Walton*).

To Inspi're. *v. a.* 1. To breathe into (*Pope*). 2. To infuse by breathing (*Wisd.*). 3. To infuse into the mind; to impress upon the fancy (*Shakspeare*). 4. To animate by supernatural infusion (*Addison*). 5. To draw in with the breath (*Harvey*).

INSPI'RER. *s.* (from *inspire.*) He that inspires (*Derham*).

To INSPI'RIT. *v. a.* (*in* and *spirit.*) To animate; to actuate; to fill with life and vigour; to enliven; to invigorate (*Pope*).

To INSPI'SSATE. *v. a.* (*in* and *spissus*, Lat.) To thicken; to make thick (*Arbuthn.*).

INSPISSA'TION. *s.* (from *inspissate.*) The act of making any liquid thick (*Arbuth.*).

INSPRUC, a populous town of Germany, in the Tyrol, capital of the district of Innthal, with a strong castle. It is seated on the river Inn. Lat. 47. 10 N. Lon. 11. 27 E.

INSTABI'LITY. *s.* (*instabilité*, French; *instabilitas*, Latin.) Inconstancy; fickleness; mutability of opinion or conduct (*Addison*).

INSTA'BLE. *a.* (*instabilis*, Lat.) Inconstant; changing.

To INSTA'LL. *v. a.* (*installer*, French.) To advance to any rank or office, by placing in the seat or stall proper to that condition (*Wotton*).

INSTALLA'TION. *s.* (*installation*, Fr.) The act of giving visible possession of a rank or office, by placing in the proper seat (*Ayliffe*).

INSTA'LMENT. *s.* (from *install.*) 1. The act of installing (*Shakspeare*). 2. The seat in which one is installed (*Shakspeare*).

I'NSTANCE. I'nstancy. *s.* (*instance*, French.) 1. Importunity; urgency; solicitation (*Hooker*). 2. Motive; influence; pressing argument: not in use (*Shakspeare*). 3. Prosecution or process of a suit (*Ayliffe*). 4. Example; document (*Add.*). 5. State of any thing (*Hale*). 6. Occasion; act (*Rogers*).

To I'nstance. *v. n.* (from the noun.) To give or offer an example (*Tillotson*).

I'NSTANT. *a.* (*instans*, Latin). 1. Pressing; urgent; importunate; earnest (*Luke. Romans*). 2. Immediate; without any time intervening; present (*Prior*). 3. Quick; making no delay (*Pope*).

I'nstant. *s.* (*instant*, French.) 1. *Instant* is such a part of duration wherein we perceive no succession (*Locke*). 2. A particular time (*Shakspeare*). 3. The present or current month (*Addison*).

INSTANTA'NEOUS. *a.* (*instantaneus*, Lat.) Done in an instant; acting at once without any perceptible succession (*Burnet*).

INSTANTA'NEOUSLY. *ad.* In an indivisible point of time (*Derham*)

I'NSTANTLY. *ad.* (*instanter*, Latin.) 1. Immediately; without any perceptible intervention of time (*Bacon*). 2. With urgent importunity.

To INSTA'TE. *v. a.* (*in* and *state.*) 1. To place in a certain rank or condition. (*Atterb.*). 2. To invest: obsolete (*Shakspeare*).

INSTAURA'TION. *s.* (*instauratio*, Lat.) Restoration; reparation; renewal.

INSTE'AD *of.* prep. (of *in* and *stead*, place.) 1. In room of; in place of (*Swift*). 2. Equal to (*Tillotson*).

To INSTE'EP. *v. a.* (*in* and *steep.*) 1. To soak; to macerate in moisture (*Shaksp.*). 2. Lying under water (*Shakspeare*).

I'NSTEP. *s.* (*in* and *step.*) The upper part of the foot where it joins to the leg (*Arbuth.*).

INSTERBURG, a town of Prussian Lithuania, containing about 3000 inhabitants. Lat. 54. 40 N. Lon. 21. 40 E.

To I'NSTIGATE. *v. a.* (*instiguer*, French.) To urge to ill; to provoke or incite to a crime.

INSTIGA'TION. *s.* (*instigation*, Fr.) Incitement to a crime; encouragement; impulse to ill (*South*).

INSTIGA'TOR. *s.* (*instigateur*, Fr.) Inciter to ill (*Decay of Piety*).

To INSTI'L. *v. a.* (*instillo*, Latin.) 1. To infuse by drops (*Milton*). 2. To insinuate any thing imperceptibly into the mind; to infuse (*Calamy*).

INSTILLA'TION. *s.* (*instillatio*, Latin.) 1. The act of pouring in by drops. 2. The act of infusing slowly into the mind. 3. The thing infused (*Rambler*).

INSTI'LMENT. *s.* (from *instil.*) Any thing instilled (*Shakspeare*).

INSTI'NCT. *a.* (*instinctus*, Latin.) Moved; animated: not in use (*Milton*).

Instinct. (*instinctus*, Lat. from *instinguo*, to stir up or stimulate.) The operation of the principle of animal or vegetable life, by the exercise of certain innate powers, directed to definite ends, and productive of definite effects. Under which definition it is opposed to reason as being the operation of the principle of intellectual life, by the exercise of observation and experience, directed to definite ends and productive of definite effects.

We hazard of ourselves this definition of instinct, and this distinction between the two principles of instinct and reason, because we have not hitherto been able to obtain from any writer whatever a definition and distinction that we have altogether felt satisfactory: in consequence of which, the two principles have been perpetually confounded, and whatever definition has been offered concerning the one has insensibly run into the other. It was hence that many of the ancient philosophers ascribed to brutes an understanding, differing only in degree from that of man, and attributed their inferiority to the want of proper and sufficient bodily organs. This system was at one time very strenuously supported by Helvetius (De l'Esprit, tom. 1. p. 2, &c.): while on the other hand, the learned Cudworth endeavoured to explain the instinct of animals, by means of a certain plastic nature. Des Cartes thought that all the actions of brute animals might be explained by the simple laws of me-

chanism, and considered them as machines totally devoid of life and sentiment, but so curiously constructed by the Creator, that the mere impressions of light, sound, and other external agents, on their organs, produced a series of motions in them, and caused them to execute those various operations which had before been ascribed to an internal principle of life and spontaneity; and the Anti-Lucretius of the cardinal Polignac (one of the most classical poems of modern times), was composed in a very considerable degree to maintain this idea. But the actions and manners of animals, which are totally incompatible with the mere principles and laws of mechanism, evince the absurdity of such an opinion. M. Buffon adopts the opinion of Des Cartes in part, but grants them life, and the faculty of distinguishing between pleasure and pain, together with a strong inclination to the former, and aversion from the latter. By these inclinations and aversions he endeavours to account for all, even the most striking, operations of animals; affirming, that, in consequence of impressions made on the brain, by means of the sensitive organs, and by the re-action of the brain and nerves on the muscles, these machines acquire a motion conformable to the nature of the animal, and of the impressions of the different objects which act upon their organs, and excite desire or aversion.

The pre-established harmony of Leibnitz has also been applied to explain the actions of brute animals. Others have considered the actions of animals as produced by the constant and immediate influence of the divine energy, directing all their inclinations and motion: such seems to have been the opinion of Mr. Addison in the second volume of the Spectator, and of Andrew Baxter in his Matho, vol. i. p. 387. The late ingenious Hermann Samuel Reimar, professor of philosophy at Hamburgh, has enumerated and exposed these and other opinions with regard to the instinct of animals, in his Observations Physiques, &c. published in 2 vols. 12mo. at Amsterdam and Paris, 1770; and, defining instinct to be every natural inclination, accompanied with a power, in animals, to perform certain actions, he considers the subject under three heads. The first, which he calls mechanical instincts, belong to the body, considered as an organized substance, and are exercised blindly and independently of the will of the animal. Such are those which produce the motion of the heart and lungs, the contraction and dilatation of the pupil, digestion, &c. This class of instincts is possessed in common both by men and brutes, and in some measure even by vegetables. The second class comprehends those which he terms representative instincts, which consist partly in the power of perceiving external objects by their present impression on the senses, and partly in the faculty of rendering the ideas of these objects present to the mind by the powers of imagination, or of memory, in a lax sense of the word. These are common to men and other animals, excepting that brutes possess only the faculty of imagination in common with us, and not that of memory, in the strict and proper sense of the word. Indeed, this author endeavours to prove, that the knowledge of brutes does not merely differ in degree from that of man, but that it is of a kind entirely different from it, and that they are incapable both of memory and reasoning; the faculty of imagination serving to give them a confused idea of events that are past, by the view or other impressions of objects that are present. The third and principal class of instincts, is that which comprehends all those which M. Reimar calls spontaneous. This species of instinct is not attended with any power of reflection, determining the animal to decide freely between two different modes of action present to his imagination; nor is it merely corporeal or mechanical. It is put into action by the natural and primitive principle of self-love, implanted in all animated beings; or by a love of pleasure and aversion from pain, producing a voluntary inclination to perform certain actions which tend to their well-being and preservation. To the performance of these actions they are particularly prompted by their present sensations, by imagination supplying the place of memory, and by other causes. The wonderful effects produced by these instinctive appetites are farther to be attributed to the exquisite mechanism in their bodily conformation, particularly in the structure of the various organs with which they execute their operations, and to the superior perfection and acuteness of their external senses, by which they are quickly and distinctly informed of those qualities of objects which most materially concern them. In order to account for the more curious and surprising operations of brute animals, M. Reimar adds two other principles, viz. 1st, an internal distinct perception of the precise power and proper use of their various bodily organs, together with an innate knowledge of the qualities of those objects around them in which they are interested; and 2dly, certain innate and determinate powers and inclinations, impressed by the Author of Nature, *à priori*, on the soul itself, by which they are arbitrarily, and without their own knowledge or consciousness, directed and irresistibly impelled to the performance of these various operations which they execute with such unremitting industry and art. These determinate forces, which constitute the principal part of M. Reimar's system, are no-where so visible and distinguishable as in that numerous set of instincts which he classes under the title of the industrious instincts of animals.

M. Dupont de Nemours, in a paper read a few years ago before the French National Institute, endeavours to resolve the instinctive into the reasoning principle; asserting that the former like the latter is alone exercised and perfected by experience, imitation or habit. He endeavours to explain physically how these animals, and children themselves, learn to suck. He shows, that several species of animals are capable of uttering sounds sufficiently nume-

rous to form a very complicated language; and he asserts, that he has observed them employ some of these sounds under circumstances so similar, as to leave scarcely any doubt of their attaching to them a fixed signification. His observations on this head are very interesting.

He likewise endeavours to prove, that various species are capable of improving their operations under certain circumstances: though perhaps the naturalist will object to him, that he has sometimes taken different species for the same species improved. Thus the architect beaver of Canada is not precisely the same as the burrowing beaver of the Rhine; and the social spider of Paraguay is not the same with our solitary spiders.

It may be supposed, that the greatest difficulty Mr. Dupont has to encounter is in explaining how insects have learned those wonderful precautions, with which they provide a shelter and proper nourishment for the egg, which they are about to lay, and the maggot that is to be produced from it; though frequently these insects have never seen, and never will see again, the egg, or a similar maggot; and the wants of the maggot have not the least resemblance to those of the insect that labours for it.

Among thousands of instances that might be adduced, Mr. Dupont has chosen but one, that of the sphex, or ichneumon wasp. In this he cannot be accused of having taken an easy example. The following is its economy: during its existence as a perfect insect, it lives entirely on flowers. When it is ready to lay, it forms a cylindrical hole in clayey sand, and deposits an egg at the bottom of it. It then seeks on cabbages a small green caterpillar on which it never preyed before; pierces it with its sting, so as to weaken it to such a degree, that it may be unable to resist the maggot which is afterward to issue from the egg and feed upon it; yet not so as to kill it, that it may not putrify; rolls it up in a circle, and lays it in the hole upon the egg. It successively proceeds in quest of eleven more of these, which it treats in a similar manner: it then closes the hole and dies. The little maggot is hatched, devours the twelve caterpillars in succession, and changes to a chrysalis in the hole. As soon as its final metamorphosis is completed, it issues from its subterranean abode a winged insect, to enjoy itself among the flowers till it also is ready to lay; when it repeats the operations its mother had performed before it, and with caterpillars of exactly the same kind.

Mr. Dupont supposes in his explanation, that the perfect insect retains the remembrance of the sensations it experienced in the state of a maggot, though its form and organs are totally changed. He must likewise suppose, though he does not expressly say it, that the sphex can afterward distinguish by the sight, or some merely imaginary sense, the caterpillar and the sand, of which it acquired a knowledge only by feeling, and this by its anterior feeling of a maggot; for the maggot is blind, it lives under ground, and when it there becomes a winged insect the caterpillars are devoured. Lastly, Mr. Dupont dares not admit, that the sphex foresees the egg it lays will produce a maggot, and will have need of all it provides for it: according to him it does this merely for amusement, in imitating what it perceived in its infancy.

Dr. Darwin does not essentially differ from M. Dupont. He also resolves every instinctive effort into an exercise of observation, experience, imitation or habit, into "repeated efforts of the muscles (in the case of animal instinct), under the conduct of our sensations or desires." Yet sensation or desire must be the sensation or desire of something known or experienced, something that has occurred to us before, or with which we have by some means or other become acquainted. We cannot long for that which we know nothing about. They tell us that infants long for the breast, because in the uterus they have already been accustomed to open their mouths, and have been pleased with sucking in some portion of the amnios that surrounded them. Were this the cause, we should expect to find them hunting after the breast, and evincing other tokens of such desire and such experience as soon as they are born: but it is commonly several days, not only before this inclination becomes apparent, but before they can by any means be induced to suck at all. In some cases it is three weeks or a month. But again, it is not in general a simple desire of sucking or swallowing that the infant evinces, but a desire of sucking a particular organ, and in a particular manner, of which no hint or information whatever could have been obtained by any antecedent action; and for which nevertheless the young of every order of mammalian animals are not only fully prepared soon after birth, but infinitely better qualified than adults with all their experience and reason to boot. What instructs the female land-crab to desert her natural crannies in woods and mountains, and to travel at spawning-time to the nearest shore, and to plunge into an element she at other periods fastidiously avoids? What induces the male pigeon, contrary to the propensity of almost all other male birds, to feed its young from the mucilage secreted in its own crop, in the same manner as the female pigeon does? It is the stimulus of a fly or other insect upon the radical leaves of the dionæa muscipula, perhaps, that induces these leaves to shut abruptly together like a serrated rat-trap. Yet the same stimulus, if merely mechanical, would still continue after the fly is dead and interlocked in the fly-trap. What, then, induces the leaves to re-open as soon as they have accomplished their purpose, notwithstanding the continuance of such stimulus? But the proofs are infinite, and we have not space to pursue them farther.

Instinct. *s.* (*instinctus*, Lat.) Desire or aversion acting in the mind without the intervention of reason or deliberation (*Prior*).

INSTI'NCTED. *a.* (*instinctus*, Lat.) Impressed as an animating power (*Bentley*).

INSTI'NCTIVE. *a.* (from *instinct.*) Act-

ing without the application of choice or reason (*Broome*).

INSTI'NCTIVELY. *ad.* By instinct; by the call of nature (*Shakspeare*).

To I'NSTITUTE. *v. n.* (*instituo*, Latin.) 1. To fix; to establish; to appoint; to enact; to settle; to prescribe (*Hale*). 2. To educate; to instruct; to form by instruction (*Decay of Piety*).

I'NSTITUTE. *s.* (*institutum*, Latin.) 1. Established law; settled order (*Dryden*). 2. Precept; maxim; principle (*Dryden*).

INSTITUTE, is a name which has lately been substituted for school or academy. Formerly institution, in the propriety of the English language, was sometimes used as a word of the same import with instruction; and now institute is employed, especially by the admirers of French innovations, to denote what had hitherto been called an academy. When royalty was abolished in France, it would have been absurd to continue the titles Royal Academy of Sciences, Royal Academy of Inscriptions, &c.; but instead of merely abolishing the word royal, and substituting national in its stead, it occurred to the fertile brain of Condorcet to abolish the seven academies themselves, or rather to melt them all down into one great academy; to which was given the appellation of the

National Institute, or New Academy of Arts and Sciences.—This academy, founded on a decree of the new constitution, was opened on the 7th of December 1795, when Benezech, the then minister for the home department, attended, and the decree of foundation was read; which was to the following purport:

"The Academy of Arts and Sciences belongs to the whole republic, and Paris is its place of residence. Its employment is to aim at bringing all arts and sciences to the utmost perfection of which they are capable. It is to notice every new attempt, and all new discoveries, and to keep up a correspondence with all foreign literary societies. And by the particular orders of the Executive Directory, its first studies are to be directed to those subjects which more immediately tend to the reputation and advantage of the French republic."

The academy consists of 288 members, half of whom are to reside in Paris, the other half in the departments; and to them is to be added a certain number of foreigners, as honorary members, confined at present to twenty-four.

The academy is divided into three classes, each class into sections, each section to contain twelve members.

1*st class*. Mathematics and natural philosophy. This class is divided into ten sections. 1. Mathematics. 2. Mechanical arts. 3. Astronomy. 4. Experimental philosophy. 5. Chemistry. 6. Natural history. 7. Botany. 8. Anatomy and animal history. 9. Medicine and surgery. 10. Animal economy, and the veterinary science.

2*d class*. Morality and politics. This class consists of six sections. 1. Analysis of sensations and ideas. 2. Morals. 3. Legislature. 4. Political economy. 5. History. 6. Geography.

3*d class*. Literature and the fine arts. This class consists of eight sections. 1. Universal grammar. 2. Ancient languages. 3. Poetry. 4. Antiquities. 5. Painting. 6. Sculpture. 7. Architecture. 8. Music.

For each class a particular room in the Louvre is appropriated. No one can be a member of two classes at the same time; but a member of one class may be present at the meetings of any other. Each class prints, yearly, an account of its transactions.

Four times a-year there are public meetings. On these occasions, the three classes meet together. At the end of each year, they give a circumstantial account to the legislative body of the progress made in that year in the arts and sciences. The prizes given yearly by each class are publicly notified at certain times. The sums requisite for the support of the institution are decreed yearly by the legislative body, upon a requisition made by the Executive Directory.

The first forty-eight members were chosen by the Executive Directory, to whom the choice of the remaining members was confided. To the members, residentiary in Paris, is reserved the choice both of the department and foreign members. On a vacancy in any class, three candidates are named by the class for the choice of the body at large.

Each class is to have, at its place of meeting, a collection of the products, both of nature and art, and a library, according to its particular wants. The regulations of the institution, with respect to the times of meeting, and its employments, are to be drawn up by the body at large, and laid before the legislative assembly. The hall in which the body at large holds its meeting forms part of the west wing of the Old Louvre, at present called the Museum. It formerly went by the appellation of the Hall of Antiques (*Salle des Antiques*); and as long as the kings of France inhabited this part of the palace, was occupied by their guards, from which circumstance it obtained the name of the Hall *des Cent Suisses*. It was likewise appropriated to banquets and entertainments, given by the court on gala days; and it was to this place that Henry IV. was conveyed, on his assassination by Ravaillac. It was built at the same time with the rest of this part of the Louvre, about the year 1528, after the designs of Pierre Lescot, abbot of Clagny. It is 144 feet in length, and 40 in breadth, and holds from 1000 to 1200 persons. In order to adapt it to its new destination, the floor has been sunk, which gives a greater air of lightness to the roof. In the centre stands a double table, in the form of a horse-shoe, supported by sphinxes, at which the members of the Institute take their seats. This table is surrounded by two tiers of benches, which are raised for the accommodation of spectators, who have likewise seats provided for them in the vast embrasures of the windows, and at each extremity of the hall.

Whether science will be essentially advanced

by this innovation, time must determine; but candour compels us to acknowledge, that thus far the proceedings of the National Institute have been abundantly interesting. Amid the changes to which the existing nomenclature of European establishments has been subjected by Bonaparte, it appears from Peyrard's translation of the Works of Archimedes, that the title of National Institute has sufficient novelty and dignity to remain without any farther modification.

INSTITU'TION. *s.* (*institutio*, Latin.) 1. Act of establishing. 2. Establishment; settlement (*Swift*). 3. Positive law (*Atterbury*). 4. Education (*Hammond*).

INSTITUTION (Royal), a new establishment in London, set on foot for the purpose of applying science to the common purposes of life. The thought originated in 1799 with a committee of the Society for bettering the condition of the Poor. Count Rumford was extremely active in the formation of the Institution.

The funds of the Institution arise, 1st, from 60 guineas paid by each hereditary subscriber, who is named a proprietor; 2d, from 15 guineas paid by each life-subscriber; 3d, from three guineas paid by each annual subscriber; 4th, from particular donations and legacies.

A proprietor has an hereditary transferable share in the house and all the property belonging to it, has a vote in the election of managers and visitors, and two transferable tickets of admission to the establishment and lectures. A life subscriber has a ticket of admission for life, not transferable. An annual subscriber is entitled to a similar ticket during the continuance of his subscription. The three classes are alike open to ladies and gentlemen, and every class of subscribers has the privilege in common of having copies of models or drawings made (at their own expence) from those belonging to the Institution.

The lectures in 1802, were, 1st, a course of experimental philosophy, comprehending the principles of astronomy, electricity, magnetism, mechanics, hydrostatics, pneumatics and optics. In this course all abstract and mathematical reasoning are avoided, and the whole calculated at once to instruct and amuse. 2d, A course of chemistry, in which the principles of the science and the modern discoveries are illustrated by experiments, and its application to the arts and manufactures, &c. shewn. 3d, An evening course, calculated for persons mechanically and scientifically engaged, in which the foregoing subjects are minutely and technically treated. Other lectures have been since added. But the principal celebrity of the Institution has arisen from the lectures of Professor Davy, and the brilliant discoveries which have been detailed and elucidated in the course of those lectures.

There are other Institutions for similar purposes in the metropolis, as the London Institution, the Surrey Institution, the Russell Institution, &c. but we have not room to detail their several plans here.

The English also boast of many charitable Institutions, as the Foundling Hospital, the Lock, the Asylum, the Small Pox Hospital, the Cow Pox Institution, the Magdalen, the Institution for the Deaf and Dumb, the London Female Penitentiary, &c. the beneficial effects of most of which have been very widely diffused.

Institutions for the purposes of education have been likewise established, as the Military Institution at Charlton, the Baptist Academical Institution at Stepney, &c.

INSTITUTION to a benefice, is that whereby the ordinary commits the cure of souls to the parson presented, as by induction he obtains a temporal right to the profits of the living. Previous to the institution, the oath against simony, the oaths of allegiance and supremacy, are to be taken; and if it be a vicarage, the oath of residence. They are also to subscribe the thirty-nine articles, and the articles concerning the king's supremacy, and the book of common prayer.

INSTITU'TIONARY. *a.* (from *institution.*) Elemental; containing the first doctrines, or principles of doctrine (*Brown*).

I'NSTITUTIST. *s.* (from *institute.*) Writer of institutes, or elemental instructions (*Harvey*).

I'NSTITUTOR. *s* (*institutor*, Lat.) 1. An establisher; one who settles (*Holder*). 2. Instructor; educator (*Walker*).

To INSTO'P. *v. a.* (*in* and *stop.*) To close up; to stop (*Dryden*).

To INSTRU'CT. *v. a.* (*instruo*, Latin.) 1. To teach; to form by precept; to inform authoritatively; to educate (*Milton*). 2. To model; to form (*Ayliffe*).

INSTRU'CTER. INSTRU'CTOR. *s.* (from *instruct.*) A teacher; an institutor (*Addison*).

INSTRU'CTION. *s.* (from *instruct.*) 1. The act of teaching; information (*Locke*). 2. Precepts conveying knowledge (*Young*). 3. Authoritative information; mandate (*Shakspeare*).

INSTRU'CTIVE. *a.* (from *instruct.*) Conveying knowledge (*Holder*).

I'NSTRUMENT. *s.* (*instrumentum*, Lat.) 1. A tool used for any work or purpose. 2. A frame constructed so as to yield harmonious sounds (*Dryden*). 3. A writing containing any contract or order (*Tobit*). 4. The agent (*Shakspeare. Locke*). 5. One who acts only to serve the purposes of another (*Dryden*).

INSTRUMENTS (Mathematical). A pocket case of mathematical instruments contains the following particulars, viz. 1. A pair of plain compasses. 2. A pair of drawing compasses, with its several parts. 3. A drawing-pen and pointer. 4. A protractor, in form of a semicircle, or sometimes of a parallelogram. 5. A parallel ruler. 6. A plain scale. 7. A sector, besides the black-lead pencil for drawing lines. See the respective words.

INSTRUME'NTAL. *a.* (*instrumental*, Fr.) 1. Conducive as means to some end; organical (*Smalridge*). 2. Acting to some end; contributing to some purpose; helpful (*Swift*). 3.

Consisting not of voices but instruments; produced by instruments; not vocal (*Milton*).

INSTRUMENTA'LITY. *s.* (from *instrumental.*) Subordinate agency; agency of any thing as means to an end (*Hale*).

INSTRUMENTALLY. *ad.* (from *instrumental.*) In the nature of an instrument, as means to an end (*Digby*).

INSTRUME'NTALNESS. *s.* (from *instrumental.*) Usefulness as means to an end.

INSUBRIUM (Ager), in ancient geography, a district of the Transpadana; situated between the Ticinus to the west, the Addua to the east, the Padus to the south, and Orobii to the north. The people are called Insubres by Livy, Insubri by Ptolemy, and Isombres by Strabo. Now the Duchy of Milan.

INSU'FFERABLE. *a.* (*in* and *sufferable.*) 1. Intolerable; insupportable; intense beyond endurance (*Locke*). 2. Detestable; contemptible (*Dryden*).

INSU'FFERABLY. *ad.* (from *insufferable.*) To a degree beyond endurance (*South*).

INSUFFI'CIENCE. INSUFFI'CIENCY. *s.* (*insufficience*, Fr.) Inadequateness to any end or purpose; want of requisite value or power (*Atterbury*).

INSUFFI'CIENT. *a.* (*insufficient*, Fr.) Inadequate to any need, use, or purpose; wanting abilities; incapable; unfit (*Rogers*).

INSUFFI'CIENTLY. *ad.* With want of proper ability; not skilfully.

INSUFFLA'TION. *s.* (*in* and *sufflo*, Lat.) The act of breathing upon (*Hammond*).

I'NSULAR. I'NSULARY. *a.* (*insulaire*, French.) Belonging to an island (*Howel*).

I'NSULATED. *a.* (*insula*, Latin.) Not contiguous on any side.

In electrical experiments, when an electric body is interposed between the earth and another body the latter is said to be insulated.

INSU'LSE. *a.* (*insulsus*, Lat.) Dull; insipid.

I'NSULT. *s.* (*insultus*, Lat.) 1. The act of leaping upon any thing (*Dryden*). 2. Act of insolence or contempt (*Broome*).

To INSU'LT. *v. a.* (*insulto*, Latin.) 1. To treat with insolence or contempt (*Pope*). 2. To trample upon; to triumph over (*Shakspeare*).

INSU'LTER. *s.* (from *insult.*) One who treats another with insolent triumph (*Rowe*).

INSU'LTINGLY. *ad.* (from *insulting.*) With contemptuous triumph (*Dryden*).

INSUPERABI'LITY. *s.* (from *insuperable.*) The quality of being invincible.

INSU'PERABLE. *a.* (*insuperabilis*, Lat.) Invincible; insurmountable; not to be conquered; not to be overcome (*Pope*).

INSU'PERABLENESS. *s.* (from *insuperable.*) Invincibleness; impossibility to be surmounted.

INSU'PERABLY. *ad.* (from *insuperable.*) Invincibly; insurmountably (*Grew*).

INSUPPO'RTABLE. *a.* (*insupportable*, Fr.) Intolerable; insufferable; not to be endured (*Bentley*)

INSUPPO'RTABLENESS. *s.* (from *insupportable.*) Insufferableness; the state of being beyond endurance (*Sidney*).

INSUPPO'RTABLY. *ad.* (from *insupportable.*) Beyond endurance (*Dryden*).

INSURANCE, in law and commerce, a contract whereby one party engages to pay the losses which the other may sustain, for a stipulated premium or consideration. The most common sorts are, insurance against the dangers of the seas, insurance against fire, insurance of debts, and insurance of lives. See ASSURANCE, and LIFE ASSURANCE: and on the latter subject, consult the ingenious work of Mr. Bailey on Life Assurances and Annuities.

INSURMO'UNTABLE *a.* (*insurmountable*, French.) Insuperable; unconquerable (*Locke*).

INSURMO'UNTABLY. *ad.* (from *insurmountable.*) Invincibly; unconquerably.

INSURRE'CTION. *s.* (*insurgo*, Latin.) A seditious rising; a rebellious commotion (*Arbuthnot*).

INSUSURRA'TION. *s.* (*insusurro*, Lat.) The act of whispering into something.

INTACTÆ, the same as ASYMPTOTES.

INTA'CTIBLE. *a.* (*in* and *tactum*, Latin.) Not perceptible to the touch.

INTA'GLIO. *s.* (Italian.) Any thing that has figures engraved on it so as to rise above the ground (*Addison*).

INTA'STABLE. *a.* (*in* and *taste.*) Not raising any sensations in the organs of taste (*Grew*).

INTE'GER. *s.* The whole of any thing. In arithmetic, a whole number, in contradistinction to a fraction See FRACTION.

I'NTEGRAL. *a.* (*integral*, Fr.) 1. Whole: applied to a thing considered as comprising all its constituent parts (*Bacon*). 2. Uninjured; complete; not defective. 3. Not fractional; not broken into fractions.

I'NTEGRAL. *s.* The whole made up of parts (*Hale. Watts*).

INTEGRAL, in the modern analysis, a variable quantity. See INCREMENT.

INTEGRAL CALCULUS, in the new analysis, the reverse of the differential calculus: it is similar to the inverse method of fluxions, or the finding of a fluent to a given fluxion. See CALCULUS.

INTEGRANT PARTICLES, the ultimate parts or molecula into which any substance may be supposed to be mechanically divided; they are the smallest particles into which a body can be reduced without decomposition. The difference between the integrant and the constituent parts of bodies, is pointed out and exemplified in the article AGGREGATION.

INTE'GRITY. *s.* (*integritas*, Latin.) 1. Honesty; uncorrupt mind; purity of manners; uncorruptedness (*Rogers*). 2. Purity; genuine unadulterated state (*Hale*). 3. Intireness; unbroken; whole (*Broome*).

INTE'GUMENT. *s.* (*integumentum*, Lat.) Any thing that covers or envelops another (*Addison*).

I'NTELLECT. *s.* (*intellectus*, Lat.) The

intelligent mind; the power of understanding (*South*).

I'NTELLECTION. *s.* (*intellectio*, Latin.) The act of understanding (*Bentley*).

INTELLE'CTIVE. *a.* (*intellectif*, Fr.) Having power to understand (*Glanville*).

INTELLE'CTUAL. *a.* (*intellectuel*, Fr.) 1. Relating to the understanding; transacted by the understanding (*Taylor*). 2. Mental; comprising the faculty of understanding; belonging to the mind (*Watts*). 3. Ideal; perceived by the intellect, not the senses (*Cowl.*). 4. Having the power of understanding (*Mil.*).

INTELLE'CTUAL. *s.* Intellect; understanding; mental powers or faculties (*Glanv.*).

INTE'LLIGENCE. INTE'LLIGENCY. *s.* (*intelligentia*, Lat.) 1. Commerce of information; notice; mutual communication; account of things distant or secret (*Hayward*). 2. Commerce of acquaintance; terms on which men live one with another (*Bacon*). 3. Spirit; unbodied mind (*Collier*). 4. Understanding; skill (*Spenser*).

INTE'LLIGENCER. *s.* (from *intelligence.*) One who sends or conveys news; one who gives notice of private or distant transactions; one who carries messages (*Howel*).

INTE'LLIGENT. *a.* (*intelligens*, Latin.) 1. Knowing; instructed; skilful (*Milton*). 2. Giving information (*Shakspeare*).

INTELLIGE'NTIAL. *a.* (from *intelligent.*) 1. Consisting of unbodied mind (*Milton*). 2. Intellectual; exercising understanding.

INTELLIGIBI'LITY. *s.* (from *intelligible*). 1. Possibility to be understood. 2. The power of understanding; intellection: not proper (*Glanville*).

INTE'LLIGIBLE. *a.* (*intelligibilis*, Latin.) To be conceived by the understanding; possible to be understood (*Watts*).

INTE'LLIGIBLENESS, *s.* (from *intelligible.*) Possibility to be understood; perspicuity (*Locke*).

INTE'LLIGIBLY. *ad.* (from *intelligible.*) So as to be understood; clearly; plainly (*Rosc.*).

INTE'MERATE. *a.* (*intemeratus*, Latin.) Undefiled; unpolluted.

INTE'MPERAMENT. *s.* (*in* and *temperament.*) Bad constitution (*Harvey*).

INTE'MPERANCE. INTE'MPERANCY. *s.* (*intemperantia*, Latin.) Want of temperance, or moderation; excess in meat or drink, or any other gratification (*Hakewill*).

INTE'MPERATE. *a.* (*intemperatus*, Lat.) 1. Immoderate in appetite; excessive in meat or drink; drunken; gluttonous (*South*). 2. Passionate; ungovernable (*Shakspeare*). 3. Excessive; exceeding the just or convenient mean: as, *an* intemperate *climate*.

INTE'MPERATELY. *ad.* 1. With breach of the law of temperance (*Tillotson*). 2. Immoderately; excessively (*Sprat*).

INTE'MPERATENESS. *s.* (from *intemperate.*) 1. Want of moderation. 2. Unseasonableness of weather.

INTE'MPERATURE. *s.* (from *intemperate.*) Excess of some quality.

To INTE'ND. *v. a.* (*intendo*, Latin.) 1. To stretch out: obsolete (*Spenser*). 2. To enforce; to make intense (*Newton*). 3. To regard; to attend; to take care of (*Bacon*). 4. To pay regard or attention to (*Bacon*). 5. To mean; to design (*Dryden*).

INTE'NDANT. *s.* (French.) An officer of the highest class, who oversees any particular allotment of the public business (*Arbuthnot*).

INTE'NDIMENT. *s.* Attention; patient hearing: not in use (*Spenser*).

INTE'NDMENT. *s.* (*entendement*, Fr.) Intention; design (*L'Estrange*).

To INTE'NERATE. *v. a.* (*in* and *tener*, Lat.) To make tender; to soften (*Philips*).

INTENERA'TION. *s.* (from *intenerate.*) The act of softening or making tender (*Bacon*).

INTE'NIBLE. *a.* (*in* and *tenible.*) That cannot hold: not in use (*Shakspeare*).

INTE'NSE. *a.* (*intensus*, Lat.) 1. Raised to a high degree; strained; forced; not slight; not lax (*Boyle*). 2. Vehement; ardent (*Ad.*). 3. Kept on the stretch; anxiously attentive (*Milton*).

INTE'NSELY. *ad.* To a great degree; not slightly; not remissly (*Addison*).

INTE'NSENESS. *s.* (from *intense.*) The state of being enforced in a high degree; force; contrariety to laxity or remission (*Woodward*).

INTE'NSION. *s.* (*intensio*, Lat.) The act of forcing or straining any thing (*Taylor*).

INTE'NSIVE. *a.* (from *intense.*) 1. Stretched or increased with respect to itself (*Hale*). 2. Intent; unremitted (*Wotton*).

INTE'NSIVELY. *ad.* By increase of degree.

INTE'NT. *a.* (*intentus*, Latin.) Anxiously diligent; fixed with close application (*Watts*).

INTE'NT. *s.* (from *intend.*) A design; a purpose; a drift; a view formed; meaning (*Hooker*).

INTE'NTION. *s.* (*intentio*, Lat.) 1. Eagerness of desire; closeness of attention; deep thought; vehemence or ardour of mind (*Sou.*). 2. Design; purpose (*Arbuthn*). 3. The state of being intense or strained (*Locke*).

INTE'NTIONAL. *a.* (*intentionel*, Fr.) Designed; done by design (*Rogers*).

INTE'NTIONALLY. *ad.* 1. By design; with fixed choice (*Hale*). 2. In will, if not in action (*Atterbury*).

INTE'NTIVE. *a.* (from *intend.*) Diligently applied; busily attentive (*Brown*).

INTE'NTIVELY. *ad.* (from *intentive.*) With application; closely.

INTE'NTLY. *ad.* (from *intent.*) With close attention; with close application; with eager desire (*Hammond*).

INTE'NTNESS. *s.* (from *intent.*) The state of being intent; anxious application (*Swift*).

To INTE'R. *v. a.* (*enterrer*, French.) To cover under ground; to bury (*Shakspeare*).

INTERAMNA, in ancient geography, so called from its situation between rivers, a town in the Cisalpennine Umbria, now called Jerni. The same name was also given to a town and colony of the Volsci, in Latium; now in ruins.

INTE'RCALAR. INTE'RCALARY. *a.* (*intercalaris*, Latin.) Inserted out of the common order to preserve the equation of time, as the

twenty-ninth of February in a leap year is an *intercalary* day.

To INTE'RCALATE. *v. a.* (*intercalo*, Lat.) To insert an extraordinary day.

INTERCALA'TION. *s.* (*intercalatio*, Lat.) Insertion of days out of the ordinary reckoning (*Brown*).

INTERCATIA, in ancient geography, a town of the Vaccæi in the Hither Spain. Here Scipio Æmilianus slew a champion of the barbarians in single combat; and was the first who mounted the wall in taking the town. It was situated to the south-east of Asturica; now said to be in ruins.

To INTERCE'DE. *v. n.* (*intercedo*, Lat.) 1. To pass between (*Newton*). 2. To mediate; to act between two parties (*Calamy*).

INTERCE'DER. *s.* (from *intercede*.) One that intercedes; a mediator.

To INTERCE'PT. *v. a.* (*interceptus*, Lat.) 1 To stop and seize in the way (*Shaksp.*). 2. To obstruct; to cut off; to stop from being communicated (*Newton*).

INTERCE'PTION. *s.* (*interceptio*, Lat.) Stoppage in course; hinderance; obstruction (*Wotton*).

INTERCE'SSION. *s.* (*intercessio*, Latin.) Mediation; interposition; agency between two parties; agency in the cause of another (*Romans*).

INTERCESSION was used in ancient Rome, for the act of a tribune of the people, or other magistrate, by which he inhibited the acts of other magistrates; or even, in case of the tribunes, the decrees of the senate. *Veto* was the solemn word used by the tribunes when they inhibited any decree of the senate, or law proposed to the people.

INTERCE'SSOR. *s.* (*intercessor*, Latin.) Mediator; agent between two parties to procure reconciliation (*South*).

To INTERCHA'IN. *v. a.* (*inter* and *chain*.) To chain; to link together (*Shakspeare*).

To INTERCHA'NGE. *v. a.* (*inter* and *change*.) 1. To put each in the place of the other; to give and take mutually (*Shakspeare*). 2. To succeed alternately (*Sidney*).

INTERCHA'NGE. *s.* (from the verb.) 1. Commerce; permutation of commodities (*Howel*). 2. Alternate succession (*Holder*). 3. Mutual donation and reception (*South*).

INTERCHA'NGEABLE. *a.* 1. Given and taken mutually (*Bacon*). 2. Following each other in alternate succession (*Tillotson*).

INTERCHA'NGEABLY. *ad.* Alternately; in a manner whereby each gives and receives (*Shakspeare*).

INTERCHA'NGEMENT. *s.* Exchange; mutual transference (*Swift*).

INTERCI'PIENT. *s.* (*intercipiens*, Lat.) An intercepting power; something that causes a stoppage (*Wiseman*).

INTERCI'SION. *s.* (*inter* and *cædo*, Lat.) Interruption (*Brown*).

To INTERCLU'DE. *v. n.* (*intercludo*, Lat.) To shut from a place or course by something intervening; to intercept (*Holder*).

INTERCLU'SION. *s.* (*interclusus*, Lat.) Obstruction; interception.

INTERCOLUMNIATION, in architecture, denotes the space between two columns, which is always to be proportioned to the height and bulk of the columns.

From a medium, some authors have laid down the following proportions: in the Tuscan order, the intercolumniation is to be four diameters of the body of the column below; in the Doric, three; in the Ionic, two; in the Corinthian, two one quarter; and in the Composite one and a half.

To INTERCO'MMON. *v. n.* (*inter* and *common*.) To feed at the same table (*Bacon*).

INTERCOMMU'NITY. *s.* (*inter* and *community*.) A mutual communication or community.

INTERCO'STAL ARTERIES. Arteriæ intercostales. The superior intercostal artery is a branch of the subclavian. The other intercostal arteries are given off from the aorta.

INTERCO'STAL MUSCLES. Intercostales externi et interni. Between the ribs, on each side, are eleven double rows of muscles. These are the intercostales externi and interni. Galen has very properly observed, that they decussate each other like the strokes of the letter X. The intercostales externi arise from the lower edge of each superior rib, and, running obliquely downwards and forwards, are inserted into the upper edge of each inferior rib, so as to occupy the intervals of the ribs, from as far back as the spine to their cartilages; but from their cartilages to the sternum there is only a thin aponeurosis covering the internal intercostales. The intercostales interni arise and are inserted in the same manner as the external. They begin at the sternum, and extend as far as the angles of the ribs, their fibres running obliquely backwards. These fibres are spread over a considerable part of the inner surface of the ribs, so as to be longer than those of the external intercostals. Some of the posterior portions of the internal intercostals pass over one rib and are inserted into the rib below. Verheyen first described these portions as separate muscles, under the name of infra costales. Winslow has adopted the same name. Cowper, and after him Douglas, calls them costarum depressores proprii. These distinctions, however, are altogether superfluous, as they are evidently nothing more than appendages of the intercostals. The number of these portions varies in different subjects. Most commonly there is only four, the first of which runs from the second rib to the fourth, the second, from the third rib to the fifth, the third, from the fourth rib to the sixth, and the fourth, from the fifth rib to the seventh. The internal intercostals of the two inferior false ribs are frequently so thin, as to be with difficulty separated from the external; and, in some subjects, one or both of them seem to be altogether wanting. It was the opinion of the ancients, that the external intercostals serve to elevate, and the internal to depress the ribs. They were probably led to this opinion, by observing the different direction of their fibres; but it is now well known, that both have the same use, which is that of raising the ribs

equally during inspiration. Fallopius was one of the first who ventured to call in question the opinion of Galen on this subject, by contending that both layers of the intercostals serve to elevate the ribs. In this opinion he was followed by Hieronymus Fabricius, our countryman Mayow, and Borelli. But, towards the close of the last century, Bayle, a writer of some eminence, and professor at Toulouse, revived the opinion of the ancients by the following arguments. He observed, that the oblique direction of the fibres of the internal intercostals is such, that, in each inferior rib, these fibres are nearer to the vertebræ than they are at their superior extremities, or in the rib immediately above; and that of course they must serve to draw the rib downwards, as towards the most fixed point. This plausible doctrine was adopted by several eminent writers, and amongst others, by Nicholls, Hoadley, and Schreiber; but, above all, by Hamberger, who went so far as to assert, that not only the ribs, but even the sternum, are pulled downwards by these muscles, and constructed a particular instrument to illustrate this doctrine. He pretended, likewise, that the intervals of the ribs are increased by their elevation, and diminished by their depression; but allowed, that while those parts of the internal intercostals that are placed between the bony part of the ribs pull them downwards, the anterior portions of the muscle, which are situated between the cartilages, concur with the external intercostals in raising them upwards. These opinions gave rise to a warm and interesting controversy, in which Hamberger and Haller were the principal disputants. The former argued chiefly from theory, and the latter from experiments on living animals, which demonstrate the fallacy of Hamberger's arguments, and prove beyond a doubt, that the internal intercostals perform the same functions as the external.

Intercostal nerve. Nervus intercostalis. Great intercostal nerve. Sympathetic nerve. The great intercostal nerve arises in the cavity of the cranium from a branch of the sixth and one of the fifth pair, uniting into one trunk, which passes out of the cranium through the carotid canal, and descends by the sides of the bodies of the vertebræ of the neck, thorax, loins, and os sacrum: in its course it receives the small accessory branches from all the thirty pair of spinal nerves. In the neck it gives off three cervical ganglions, the upper, middle, and lower; from which the cardiac and pulmonary nerves arise. In the thorax it gives off the splanchnic or anterior intercostal, which perforates the diaphragm, and forms the semilunar ganglions, from which nerves pass to all the abdominal viscera. They also form in the abdomen ten peculiar plexuses, distinguished by the name of the viscus to which they belong, as the cœliac, splenic, hepatic, superior, middle and lower mesenteric, two renal, and two spermatic plexuses. The posterior intercostal nerve gives accessory branches about the pelvis and ischiatic nerve, and at length terminates.

Intercostal veins. Veins which empty their blood into the vena azygos.

I'NTERCOURSE. *s.* (*entrecours*, Fr.) 1. Commerce; exchange (*Milton*). 2. Communication (*Bacon*).

INTERCU'RRENCE. *s.* (from *intercurro*.) Latin.) Passage between (*Boyle*).

INTERCU'RRENT. *a.* (*intercurrens*, Lat.) Running between (*Boyle*).

INTERDE'AL. *s.* (*inter* and *deal*.) Traffick; intercourse: obsolete (*Spenser*).

To INTERDI'CT. *v. a.* (*interdico*, Latin.) 1. To forbid; to prohibit (*Tickel*). 2. To prohibit from the enjoyment of communion with the church (*Ayliffe*).

Interdi'ct. *s.* (from the verb.) 1. Prohibition; prohibiting decree (*Bacon*). 2. A papal prohibition to the clergy to celebrate the holy offices (*Wotton*).

INTERDI'CTION. *s.* (*interdictio*, Lat.) 1. Prohibition; forbidding decree (*Milton*). 2. Curse; from the papal *interdict* (*Shaksp.*).

INTERDI'CTORY. *a.* (from *interdict*.) Belonging to an interdiction (*Ainsworth*).

To INTERE'SS. *To* Intere'st. *v. a.* (*interesser*, French.) To concern; to affect; to give share in (*Dryden*).

To INTERE'ST. *v. n.* To affect; to move; to touch with passion.

I'nterest. *s.* (*interest*, Lat. *interet*, Fr.) 1. Concern; advantage; good (*Hammond*). 2. Influence over others (*Clarendon*). 3. Share; participation (*Watts*). 4. Regard to private profit (*Swift*). 5. Money paid for use; usury (*Arbuthnot*). 6. Any surplus of advantage (*Shaksp.*). In the fifth sense above, we must speak of interest more at large, as follows:

Interest is a sum reckoned for the loan or forbearance of another sum, or principal, lent for, or due at, a certain time, according to some certain rate or proportion; being estimated usually at so much per cent. or by the 100. This forms a particular rule in arithmetic The highest legal interest now allowed in England is after the rate of 5 per cent. per annum, or the 20th part of the principal for the space of a year, and so in proportion for other times, either greater or less. Except in the case of pawn-brokers, to whom it has lately been made legal to take a higher interest, for one of the worst and most destructive purposes that can be suffered in any state.

Interest is either simple or compound.

Interest (Simple), is that which is counted and allowed upon the principal only, for the whole time of forbearance.

The sum of the principal and interest is called the amount.

As the interest of any sum, for any time, is directly proportional to the principal sum and time, therefore the interest of one pound for one year being multiplied by any proposed principal sum, and by the time of its forbearance, in years and parts, will be its interest for that time. That is, if

r = the rate of interest of 1*l.* per annum,
p = any principal sum lent,
t = the time it is lent for, and

$a =$ the amount, or sum of principal and interest; then is $prt =$ the interest of the sum p, for the time t, at the rate r; and consequently $p + prt = p \times \overline{1+rt} = a$, the amount of the same for that time. And from this general theorem, other theorems can easily be deduced for finding any of the quantities above mentioned; which collected all together, will be as follow:

1st, $a = p + prt$ the amount,

2d, $p = \frac{a}{1+rt}$ the principal,

3d, $r = \frac{a-p}{pt}$ the rate,

4th, $t = \frac{a-p}{pr}$ the time.

A very easy and general method of computing simple interest, is by means of the following small but comprehensive table.

A General Interest Table,

By which the interest of any sum, at any rate, and for any time, may be readily found.

Days.	3 per cent.				3½ per cent.				4 per cent.				4½ per cent.				5 per cent.			
	l.	s.	d.	q.	l.	s.	d.	q.	l.	s.	d.	q.	l.	s.	d.	q.	l.	s.	d.	q.
1			1	3			2	1			2	2			3	0			3	1
2			3	3			4	2			5	1			6	0			6	2
3			5	3			6	3			7	3			8	3			9	3
4			7	3			9	0			10	2			11	3		1	1	0
5			9	3			11	2		1	1	1		1	2	3		1	4	1
6			11	3		1	1	3		1	3	3		1	5	3		1	7	2
7		1	1	3		1	4	0		1	6	1		1	8	3		1	11	0
8		1	3	3		1	6	1		1	9	0		1	11	3		2	2	1
9		1	5	3		1	8	2		1	11	2		2	2	2		2	5	2
10		1	7	2		1	11	0		2	2	1		2	5	2		2	8	3
20		3	3	1		3	10	0		4	4	2		4	11	1		5	5	3
30		4	11	0		5	9	0		6	6	3		7	4	2		8	2	2
40		6	6	3		7	8	0		8	9	0		9	10	1		10	11	2
50		8	2	2		9	7	0		10	11	2		12	3	3		13	8	1
60		9	10	1		11	6	0		13	1	3		14	9	2		16	5	1
70		11	6	0		13	5	0		15	4	0		17	3	1		19	2	0
80		13	1	3		15	4	0		17	6	1		19	8	3	1	1	11	0
90		14	9	2		17	3	0		19	8	2	1	2	2	1	1	4	7	3
100		16	5	1		19	2	0	1	1	11	0	1	4	8	0	1	7	4	3
200	1	12	10	2	1	18	4	1	2	3	10	0	2	9	3	3	2	14	9	2
300	2	9	3	3	2	17	6	1	3	5	9	0	3	13	11	3	4	2	2	1

N. B. This table contains the interest of 100l. for all the several days in the first column, and at the several rates of 3, 3½, 4, 4½, and 5 per cent. in the other five columns.

To find the interest of 100*l. for any other time,* as 1 year and 278 days, at 4½ per cent. Take the sums for the several days as here below.

The int. for 1 year	4	10	0	0
Against 200 ds. is	2	9	3	3
——— 70 ds. --	0	17	3	1
——— 8 ds. --	0	1	11	0
Interest required -	7	18	6	0

For any other sum than 100*l.* First find for 100l. as above, and take it so many times or parts as the sum is of 100l. Thus, to find for 355l. at 4½, for one year and 278 days.

First, 3 times the above sum,

(for 300l.) is -	23	15	8	1
½ (for 50l.) is -	3	19	3	1
$\frac{1}{10}$ of this (for 5l.)	0	7	11	0
So for 355 it is -	28	2	10	2

When the interest is required for any other rate than those in the table, it may be easily made out from them. So ½ of 5 is 2½, ½ of 4 is 2, ½ of 3 is 1½, ⅓ of 3 is 1, ¼ of 3 is ¾, and $\frac{1}{12}$ of 3 is ¼. And so, by parts, or by adding or subtracting, any rate, may be made out.

A very curious and universal table of interest, founded upon a singular property of prime numbers, has been invented by H. Goodwyn, Esq. It is given in Nicholson's Journal, vol. iv. p. 437, 4to.

Interest (Compound), called also Interest-upon-Interest, is that which is counted not only upon the principal sum lent, but also for its interest, as it becomes due, at the end of each stated time of payment.

Although it be not lawful to lend money at compound interest, yet in purchasing annuities, pensions, &c. and taking leases in reversion, it is usual to allow compound interest to the purchaser for his ready money; and therefore it is very necessary to understand this subject.

Besides the quantities concerned in simple interest, viz. the principal p, the rate or interest of 1l. for 1 year r, the amount a, and the time t, there is another quantity employed in compound interest, viz. the ratio of the rate of interest, which is the amount of 1l. for one time of payment, and which here let be denoted by R, viz. $R = 1 + r$. Then, the particular amounts for the several times may be thus computed, viz. As 1l. is to its amount for any time, so is any proposed principal sum to its amount for the same time; i. e.

$1l. : R :: p \quad : pR$ the 1st year's amount,
$1l. : R :: pR \quad : pR^2$ the 2d year's amount,
$1l. : R :: pR^2 \quad : pR^3$ the 3d year's amount,
and so on.

Therefore in general, $pR^t = a$ is the amount for the t year, or t time of payment. From whence the following general theorems are deduced:

1st, $a = pR^t$ the amount,

2d, $p = \frac{a}{R^t}$ the principal,

3d, $r = \sqrt[t]{\frac{a}{p}}$ the ratio,

4th, $t = \frac{\text{log. of } a - \text{log. of } p}{\text{log. of R}}$ the time.

From which any one of the quantities may be found, when the rest are given.

For example, suppose it were required to find in how many years any principal sum will double itself, at any rate of interest. In this case we must employ the 4th theorem, where a will be $= 2p$, and then it is

$$t = \frac{\text{l. } a - \text{l. } p}{\text{log. R}} = \frac{\text{l. } 2p - \text{l. } p}{\text{log. R}} = \frac{\text{log. } 2}{\text{log.R}}.$$

So, if the rate of interest be 5 per cent. per annum; then $R = 1 + \cdot 05 = 1 \cdot 05$, and hence

$$t = \frac{\text{log. } 2}{\text{log.} 1 \cdot 05} = \frac{\cdot 3010300}{\cdot 0211893} = 14 \cdot 2067 \text{ nearly:}$$

that is, any sum doubles in $14\frac{1}{4}$ years nearly, at the rate of 5 per cent. per annum compound interest.

But compound interest is best computed by means of such a table as the following; containing the amounts of 1l. from 1 year to 40, at various rates of interest.

Yrs.	at 3 per cent.	at $3\frac{1}{2}$ per cent.	at 4 per cent.	at $4\frac{1}{2}$ per cent.	at 5 per cent.	at 6 per cent.
1	1·03000	1·03500	1·04000	1·04500	1·05000	1·06000
2	1·06090	1 07123	1·08160	1·09203	1·10250	1·12360
3	1·09273	1·10872	1·12486	1·14117	1·15763	1·19102
4	1·12551	1·14752	1·16986	1·19252	1·21551	1·26248
5	1·15927	1·18769	1·21665	1·24618	1·27628	1·33823
6	1·19405	1·22926	1·26532	1·30226	1·34010	1·41852
7	1·22987	1·27228	1·31593	1·36086	1·40710	1·50363
8	1·26677	1·31681	1·36857	1·42210	1·47746	1·59385
9	1·30477	1·36290	1·42331	1·48610	1·55133	1·68948
10	1·34392	1·41060	1·48024	1·55297	1·62890	1·79085
11	1·38423	1·45997	1·53945	1·62285	1·71034	1·89830
12	1·42576	1·51107	1·60103	1·69588	1·79586	2·01220
13	1·46853	1·56396	1·66507	1·77220	1·88565	2·13293
14	1·51259	1·61869	1·73168	1·85194	1·97993	2·26090
15	1·55797	1·67535	1·80094	1·93528	2·07893	2·39656
16	1·60471	1·73399	1·87298	2·02237	2·18287	2·54035
17	1·65285	1·79468	1·94790	2·11338	2·29202	2·69277
18	1·70243	1·85749	2·02582	2·20848	2·40662	2·85434
19	1·75351	1·92250	2·10685	2·30786	2·52695	3·02560
20	1·80611	1·98979	2·19112	2·41171	2·65330	3·20714
21	1·86029	2·05943	2·27877	2·52024	2·78596	3·39956
22	1·91610	2·13151	2·36992	2·63365	2·92526	3·60354
23	1·97359	2·20611	2·46472	2·75217	3·07152	3·81975
24	2·03279	2·28333	2·56330	2·87601	3·22510	4·04893
25	2·09378	2·36324	2·66584	3·00543	3·38635	4·29187
26	2·15659	2·44596	2·77247	3·14068	3·55567	4·54938
27	2·22129	2·53157	2·88337	3·28201	3·73346	4·82235
28	2·28793	2·62017	2·99870	3·42970	3·92013	5·11169
29	2·35657	2·71188	3·11865	3·58404	4·11614	5·41839
30	2·42726	2·80679	3·24340	3·74532	4·32194	5·74349
31	2·50008	2·90503	3·37313	3·91386	4·53804	6·08810
32	3·57508	3·00671	3·50806	4·08998	4·76494	6 45339
33	2·65234	3·11194	3·64838	4·27403	5·00319	6·84059
34	2·73191	3·22086	3·79432	4·46636	5·25335	7·25103
35	2·81386	3·33359	3·94609	4·66735	5·51602	7·68609
36	2·89828	3·45027	4·10393	4·87738	5·79132	8·14725
37	2·98523	3·57103	4·26809	5·09686	6·08141	8·63609
38	3·07478	3·69601	4·43881	5·32622	6·38548	9·15425
39	3·16703	3·82537	4·61637	5·56590	6·70475	9·70351
40	3·26204	3·95926	4·80102	5·81636	7·03999	10·28572

By this table we may calculate the interest, or the amount, of any principal sum for any time, not more than 40 years. For an example, take 523l. for 15 years, at 5 per cent per annum, compound interest. In the table on the line 15, and column 5 per cent. is the amount of 1*l.* viz. 2·07893
This multiplied by the principal 523

gives the amount 1087·28039
or 1087l. 5s. $7\frac{1}{4}$d. Therefore the interest is 564l. 5s. $7\frac{1}{4}$d.

The reader may advantageously consult Keith's, Malcolm's, and Hutton's Arithmetic: Smart's and King's Interest Tables; and Baily's Doctrine of Interest and Annuities. See also Annuities, Discount, &c.

To INTERFE'RE. *v. n.* (*inter* and *ferio*, Latin.) 1. To interpose; to intermeddle (*Swift*). 2. To clash; to oppose each other (*Smalridge*). 3. A horse is said to *interfere*, when the side of one of his shoes strikes against and hurts one of his fetlocks (*Farrier's Dict.*)

INTERFLU'ENT. *a.* (*interfluens*, Latin.) Flowing between (*Boyle*).

INTERFOLIA'CEOUS flowers or peduncles. In botany, *inter folia opposita, sed alternatim collocati.* Between opposite leaves, but placed alternately with them: as in Asclepias. Contrasted with *oppositi folii.*

INTERFU'LGENT. *a.* (*inter* and *fulgens*, Latin.) Shining between.

INTERFU'SED. *a.* (*interfusus*, Latin.) Poured or scattered between (*Milton*).

INTERJA'CENCY. *s.* (from *interjacens*, Latin.) 1. The act or state of lying between (*Hale*). 2. The thing lying between (*Brown*).

INTERJA'CENT. *a.* (*interjacens*, Latin.) Intervening; lying between (*Raleigh*).

INTERJE'CTION. *s.* (*interjectio*, Latin.) 1. A part of speech that discovers the mind to be seized or affected with some passion: such as are in English, *O! alas! ah!* 2. Intervention; interposition; act of something coming between (*Bacon*).

I'NTERIM. *s.* (*interim*, Lat.) Mean time; intervening time (*Tatler*).

To INTERJO'IN. *v. a.* (*inter* and *join.*) To join mutually; to intermarry (*Shak.*)

INTE'RIOUR. *a.* (*interior*, Latin.) Internal; inner; not outward; not superficial (*Bu.*)

INTERKNO'WLEDGE. *s.* (*inter* and *knowledge.*) Mutual knowledge (*Bacon*).

To INTERLA'CE. *v. a.* (*entrelasser*, Fr.) To intermix; to put one thing within another (*Hayward*).

INTERLA'PSE. *s.* (*inter* and *lapse.*) The flow of time between any two events. (*Har.*)

To INTERLA'RD. *v. a.* (*entrelarder*, Fr.) 1. To mix meat with bacon, or fat. 2. To interpose; to insert between (*Carew*). 3. To diversify by mixture (*Hale*).

To INTERLE'AVE. *v. a.* (*inter* and *leave.*) To chequer a book by the insertion of blank leaves.

To INTERLI'NE. *v. a.* (*inter* and *line.*) 1. To write in alternate lines (*Locke*). 2. To correct by something written between the lines (*Dryden*).

INTERLINEA'TION. *s.* (*inter* and *lineation.*) Correction made by writing between the lines (*Swift*).

To INTERLI'NK *v. a.* (*inter* and *link.*) To connect chains one to another; to join one in another (*Dryden*).

INTERLOCU'TION. *s.* (*interlocutio*, Lat.) 1. Dialogue; interchange of speech (*Hook.*). 2. Preparatory proceeding in law; an intermediate act before final decision (*Addison*).

INTERLO'CUTOR. *s.* (*inter* and *loquor*, Latin.) Dialogist; one that talks with another.

INTERLOCU'TORY. *a.* (*interlocutoire*, Fr.) 1. Consisting of dialogue (*Fiddes*). 2. Preparatory to decision.

To INTERLO'PE. *v. n.* (*inter* and *loopen*, Dutch.) To run between parties and intercept the advantage that one should gain from the other; to traffic without a proper licence (*Tatler*).

INTERLO'PER. *s.* (from *interlope.*) One who runs into business to which he has no right (*L'Estrange*).

INTERLU'CENT. *a.* (*interlucens*, Latin.) Shining between.

INTERLU'DE, an entertainment exhibited on the theatre between the acts of a play, to amuse the spectators while the actors take breath and shift their dress, or to give time for changing the scenes and decorations. In the ancient tragedy, the chorus sung the interludes, to show the intervals between the acts. Interludes, among us, usually consist of songs, dances, feats of activity, concerts of music, &c.

INTERLU'ENCY. *s.* (*interluo*, Lat.) Water interposited; interposition of a flood (*Hale*).

INTERLU'NAR. } *a.* (*inter* and *luna*,
INTERLU'NARY. } Lat.) Belonging to the time when the moon, about to change, is invisible (*Milton*).

INTERMA'RRIAGE. *s.* (*inter* and *marriage.*) Marriage between two families, where each takes one and gives another (*Addison*).

To INTERMA'RRY. *v. n.* (*inter* and *marry.*) To marry some of each family with the other (*Swift*).

To INTERME'DDLE. *v. n.* (*inter* and *meddle.*) To interpose officiously. (*Claren.*)

To Interme'ddle. *v. a.* (*intremesler*, Fr.) To mingle; to intermell (*Spenser*).

INTERME'DDLER. *s.* (from *intermeddle.*) One that interposes officiously; one that thrusts himself into business to which he has no right (*L'Estrange*).

INTERME'DIACY. *s.* (from *intermediate.*) Interposition; intervention (*Derham*).

INTERME'DIAL. *a.* Intervening; lying between; intervenient (*Evelyn*).

INTERME'DIATE. *a.* (*intermedial*, Fr.) Intervening; interposed (*Newton*).

INTERME'DIATELY. *ad.* (from *intermediate.*) By way of intervention.

INTERME'DIUM, or Intermediate Substance, in chemistry. Those are called intermediate substances, or intermediated, by means of which other substances, incapable of combining by themselves, are made to unite. For example, saline, acid, or alkaline substances, by means of which oils are brought to a saponaceous state, and are thereby rendered miscible with water, are the intermediates of this union of oil with water; because, without these substances, oil and water cannot be united, or even well mixed. An office nearly similar belongs to these fluxes which are used to effect or facilitate the reduction or melting of metals. See Flux. Sometimes the term is applied to those substances that are used for the immediate purpose of disuniting others, which cannot otherwise be separated. In this sense, sulphuric acid is an intermediate, by which nitrous or muriatic acid may be separated from any alkaline salt, with which either of them may happen to be united.

To INTERME'LL. *v. a.* (*entremesler*, Fr.) To mix; to mingle: not in use (*Spenser*).

INTE'RMENT, the act of interring, i. e. burying or laying a deceased person in the ground. Aristotle asserted, that it was more just to assist the dead than the living. Plato, in his Republic, does not forget, amongst other parts of justice, that which concerns the dead. Cicero establishes three kinds of justice: the first respects the gods, the second the manes or dead, and the third men. These principles seem to be drawn from nature; and they appear at least to be necessary for the support of society, since at all times civilized nations have taken care to bury their dead, and to pay their last respects to them.

We find in history several traces of the respect which the Indians, the Egyptians, and the Syrians entertained for the dead. The Syrians embalmed their bodies with myrrh, aloes, honey, salt, wax, bitumen, and resinous gums; they dried them also with the smoke of the fir and the pine tree. The Egyptians preserved theirs with the resin of the cedar, with aromatic spices, and with salt. These people often kept such mummies, or at least their effigies, in their houses; and at grand entertainments they were introduced, that by reciting the great actions of their ancestors they might be better excited to virtue.

The Turks have, at all times, been accustomed to wash the bodies of their dead before interment; and as their ablutions are complete, and no part of the body escapes the attention of those who assist at such melancholy ceremonies, they can easily perceive whether one be really dead or alive, by examining, among other methods of proof, whether the *sphincter ani* has lost its power of contraction. If this muscle remains still contracted, they warm the body, and endeavour to recall it to life; otherwise, after having washed it with water and soap, they wipe it with linen cloths, wash it again with rose water and aromatic substances, cover it with a rich dress, put upon its head a cap ornamented with flowers, and extend it upon a carpet placed in the vestibule or hall at the entrance of the house.

In the primitive church the dead were washed and then anointed; the body was wrapped up in linen, or clothed in a dress of more or less value according to circumstances, and it was not interred until after being exposed and kept some days in the house. The custom of clothing the dead was usual in France only for princes and ecclesiastics.

In other countries, more or less care is taken to prevent sudden interments. At Geneva, there are people appointed to inspect all dead bodies. Their duty consists in examining whether the person be really dead, and whether one died naturally or by violence. In the north, as well as at Genoa, it is usual not to bury the dead till three days have expired. In Holland, people carry their precautions much farther, and delay the funerals longer. And in England bodies generally remain unburied three or four days. Notwithstanding these precautions, however, it is to be feared, that in numerous instances too much precipitation attends this last office; and as the consequences of premature interment are extremely dreadful, we cannot forbear seizing another opportunity of recommending an earnest attention to what has been said relative to this subject under the articles Premature Burial, Symptoms of Death, and Putrefaction.

Indeed, it must appear astonishing that the attention of mankind has been so little roused by an idea the most terrible that can be conceived on this side of eternity. According to present usage, as soon as the semblance of death appears, the chamber of the sick is deserted by friends, relatives, and physicians; and the apparently dead, though frequently living, body is committed to the management of an ignorant and unfeeling nurse, whose care extends no farther than laying the limbs straight, and securing her accustomed perquisites. The bed-clothes are immediately removed, and the body is exposed to the air. This, when cold, must extinguish any spark of life that may remain, and which, by a different treatment, might have been kindled into flame; or it may only continue to repress it, and the unhappy person afterwards revive amidst the horrors of the tomb.

In apoplectic and fainting fits, and in those arising from any violent agitation of mind, also when opium or spirits have been too freely used, there is reason to fear that the appearance of death has been frequently mistaken for the reality; nay even in old age, when life seems to have been gradually drawing to a close, the symptoms of death are often fallacious. The following instance is recorded in the London Chronicle, vol. iv, p. 456. A lady in Cornwall, more than 80

years of age, who had been a considerable time declining, took to her bed, and in a few days seemingly expired in the morning. As she had often desired not to be buried till she had been two days dead, her request was to have been regularly complied with by her relations. All that saw her looked upon her as dead, and the report was current through the whole place; nay, a gentleman of the town actually wrote to his friend in the island of Scilly that she was deceased. But one of those who were paying the last kind office of humanity to her remains, perceived some warmth about the middle of the back; and acquainting her friends with it, they applied a mirror to her mouth, but, after repeated trials, could not observe it in the least stained; her under jaw was likewise fallen, as the common phrase is; and, in short, she had every appearance of a dead person. All this time she had not been stripped or dressed; but the windows were opened, as is usual in the chambers of the deceased. In the evening the heat seemed to increase, and at length she was perceived to breathe.

Almost every one knows that Vesalius, the father of modern anatomy, having been sent for to open a woman subject to hysterics, who was supposed to be dead, he perceived, on making the first incision, by her motion and cries, that she was still alive; that this circumstance rendered him so odious, that he was obliged to fly; and that he was so much affected by it, that he died soon after. On this occasion, we cannot forbear to add an event more recent, but no less melancholy. The Abbé Prevost, so well known by his writings and the singularities of his life, was seized with a fit of the apoplexy, in the forest of Chantilly, on the 23d of October 1763. His body was carried to the nearest village, and the officers of justice were proceeding to open it, when a cry which he sent forth affrightened all the assistants, and convinced the surgeon that the Abbé was not dead; but it was too late to save him, as he had already received the mortal wound!

INTERMIGRA'TION. *s.* (*intermigration*, Fr.) Act of removing from one place to another, so as that of two parties removing, each takes the place of the other (*Hale*).

INTE'RMINABLE. *a.* (*in* and *termino*, Latin.) Immense; admitting no boundary (*Milton*).

INTE'RMINATE. *a.* (*interminatus*, Lat.) Unbounded; unlimited (*Chapman*).

INTERMINA'TION. *s.* (*intermino*, Lat.) Menace; threat (*Decay of Piety*).

To INTERMI'NGLE. *v. a.* (*inter* and *mingle.*) To mingle; to mix; to put some things among others (*Hooker*).

To INTERMI'NGLE. *v. n.* To be mixed or incorporated.

INTERMI'SSION. *s.* (*intermissio*, Latin.) 1. Cessation for a time; pause; intermediate stop (*Wilkins*). 2. Intervenient time (*Shak.*) 3. State of being intermitted (*Ben Jonson.*) 4. The space between the paroxysms of a fever; or any fits of pain; rest (*Milton*).

INTERMI'SSIVE. *a.* (from *intermit.*) Coming by fits; not continual (*Brown*).

To INTERMI'T. *v. a.* (*intermitto*, Lat.) To forbear any thing for a time; to interrupt (*Rogers*).

To INTERMI'T. *v. n.* To grow mild between fits or paroxysms.

INTERMI'TTENT. *a.* (*intermittens*, Lat.) Coming by fits (*Harvey*).

INTERMI'TTENT FEVER. See FEVER, and FEBRIS *intermittens*.

To INTERMI'X. *v. a.* (*inter* and *mix.*) To mingle; to join; to put some things among others (*Hayward*).

To INTERMI'X. *v. n.* To be mingled together.

INTERMI'XTURE. *s.* (*inter* and *mixture*, Latin.) 1. Mass formed by mingling bodies (*Boyle*). 2. Something additional mingled in a mass (*Bacon*).

INTERMU'NDANE. *a.* (*inter* and *mundus*, Latin.) Subsisting between worlds, or between orb and orb (*Locke*).

INTERMU'RAL. *a.* (*inter* and *murus*, Lat.) Lying between walls (*Ainsworth*).

INTERMU'TUAL. *a.* (*inter* and *mutual.*) Mutual; interchanged (*Daniel*).

INTE'RN. *a.* (*internus*, Lat.) Inward; intestine; not foreign (*Howel*).

INTE'RNAL. *a.* (*internus*, Latin.) 1. Inward; not external (*Locke*). 2. Intrinsic; not depending on external accidents; real (*Rogers*).

INTE'RNALLY. *ad.* 1. Inwardly. 2. Mentally; intellectually (*Taylor*).

INTERNE'CINE. *a.* (*internecinus*, Latin.) Endeavouring mutual destruction. (*Hudib.*)

INTERNE'CION. *s.* (*internecio*, Latin.) Mutual destruction; massacre; slaughter (*Hale*).

INTE'RNODE. In botany, *internodium*. The space between knot and knot, or joint and joint. In pure English, we have no term appropriate to this idea, for which reason we are compelled to anglicize the Latin term. The joint is properly the articulation itself, from *junctura*; although in common language we use it also for the space between two joints.

INTERNU'NCIO. *s.* (*internuncius*, Latin.) Messenger between two parties.

INTERO'SSEI MANUS, (*interosseus musculus*, from *inter*, between, and *os*, the bone.) These are small muscles situated between the metacarpal bones, and extending from the bones of the carpus to the fingers. They are divided into internal and external; the former are to be seen only on the palm of the hand, but the latter are conspicuous both on the palm and back of the hand. The interossei interni are three in number. The first, which Albinus names posterior indicis, arises tendinous and fleshy from the basis and inner part of the metacarpal bone of the fore-finger, and likewise from the up-

per part of that which supports the middle finger. Its tendon passes over the articulation of this part of these bones with the fore-finger, and uniting with the tendinous expansion that is sent off from the extensor digitorum communis, is inserted into the posterior convex surface of the first phalanx of that finger. The second and third, to which Albinus gives the names of prior annularis, and interosseus auricularis, arise, in the same manner, from the bases of the outsides of the metacarpal bones that sustain the ring finger and the little finger, and are inserted into the outside of the tendinous expansion of the extensor digitorum communis that covers each of those fingers. These three muscles draw the fingers, into which they are inserted, towards the thumb. The interossei externi are four in number, for among these is included the small muscle that is situated on the outside of the metacarpal bone that supports the fore-finger. Douglas calls it extensor tertii internodii indicis, and Winslow, semi interosseus indicis. Albinus, who describes it among the interossei, gives it the name of prior indicis. This first interosseus externus arises by two tendinous and fleshy portions. One of these springs from the upper half of the inner side of the first bone of the thumb, and the other from the ligaments that unite the os trapezoides to the metacarpal bone of the fore-finger, and likewise from all the outside of this latter bone. These two portions unite as they descend, and terminate in a tendon, which is inserted into the outside of that part of the tendinous expansion from the extensor digitorum communis that is spread over the posterior convex surface of the fore-finger. The second, to which Albinus gives the name of prior medii, is not quite so thick as the last described muscle. It arises by two heads, one of which springs from the inner side of the metacarpal bone of the fore-finger, chiefly towards its convex surface, and the other arises from the adjacent ligaments, and from the whole outer side of the metacarpal bone that sustains the middle finger. These two portions unite as they descend, and terminate in a tendon, which is inserted, in the same manner as the preceding muscle, into the outside of the tendinous expansion that covers the posterior part of the middle finger. The third belongs likewise to the middle finger, and is thence named posterior medii by Albinus. It arises, like the last described muscle, by two origins, which spring from the roots of the metacarpal bones of the ring and middle fingers, and from the adjacent ligaments, and is inserted into the inside of the same tendinous expansion as the preceding muscle. The fourth, to which Albinus gives the name of posterior annularis, differs from the two last only in its situation, which is between the metacarpal bones of the ring and little fingers. It is inserted into the inside of the tendinous expansion of the extensor digitorum communis that covers the posterior part of the ring finger. All these four muscles serve to extend the fingers into which they are inserted, and likewise to draw them inwards towards the thumb, except the third, or posterior medii, which, from its situation and insertion, is calculated to pull the middle finger outwards.

Interossei Pedis. These small muscles in their situation between the metatarsal bones resemble the interossei of the hand, and, like them, are divided into internal and external. The interossei pedis internii are three in number. They arise tendinous and fleshy from the basis and inside of the metatarsal bones of the middle, the third, and the little toes, in the same manner as those of the hand, and they each terminate in a tendon that runs to the inside of the first joint of these toes, and from thence to their upper surface, where it loses itself in the tendinous expansion that is sent off from the extensors. Each of these three muscles serves to draw the toe, into which it is inserted, towards the great toe. The interossei externi are four in number. The first arises tendinous and fleshy from the outside of the root of the metatarsal bone of the great toe, from the os cuneiforme internum, and from the root of the inside of the metatarsal bone of the fore toe. Its tendon is inserted into the inside of the tendinous expansion that covers the back part of the toes. The second is placed in a similar manner between the metatarsal bones of the fore and middle toes, and is inserted into the outside of the tendinous expansion on the back part of the fore toe. The third and fourth are placed between the two next metatarsal bones, and are inserted into the outside of the middle and third toes. The first of these muscles draws the fore toe inwards towards the great toe. The three others pull the toes, into which they are inserted, outwards. They all assist in extending the toes.

INTERPELLA'TION. *s.* (*interpellatio*, Latin.) A summons; a call upon (*Ayliffe*).

To INTE'RPOLATE. *v. a.* (*interpolo*, Latin.) 1. To foist any thing into a place to which it does not belong (*Pope*). 2. To renew; to begin again: not used (*Hale*).

INTERPOLA'TION. *s.* (*interpolation*, Fr.) Something added or put into the original matter (*Cromwell*).

Interpolation, in the modern Algebra, is used for finding an intermediate term of a series, its place in such series being given.

The following are among the most useful rules and theorems in the method of interpolation. . . . When the first, second, or other successive differences of the terms of a series become at last equal, the Interpolation of any term of such a series may be found by Newton's Differential Method.

INTERPOLATION.

When the algebraical equation of a series is given, the term required, whether it be a primary or intermediate one, may be found by the resolution of affected equations; but when that equation is not given, as it often happens, the value of the term sought must be exhibited by a converging series, or by the quadrature of curves.

Let A denote any term of an equidistant series of terms, and a, b, c, &c. the first of the first, second, third, &c. orders of differences; then the term z, whose distance from A is expressed by x, will be this, viz. Theorem 1,

$$z = A + xa + x.\frac{x-1}{2}b + x.\frac{x-1}{2}.\frac{x-2}{3}c \text{ \&c.}$$

Hence, if any of the orders of differences become equal to one another, or $=0$, this series for the interpolated term will break off, and terminate, otherwise it will run out in an infinite series.

Ex. To find the 20th term of the series of cubes 1, 8, 27, 64, 125, &c. or 1^3, 2^3, 3^3, 4^3, 5^3, &c.

Set down the series in a column, and take their continual differences as here annexed, where the 4th differences, and all after it become $=0$, also $A=1$, $a=7$, $b=12$, $c=6$, and $x=19$; therefore the 20th term sought is barely

$$\begin{array}{ccccc}
A & & & & \\
 & a & & & \\
1 & & & & \\
 & 7 & b & & \\
8 & & & c & \\
 & 19 & 12 & & d \\
27 & & & 6 & \\
 & 37 & 18 & & 0 \\
64 & & & 6 & \\
 & 61 & 24 & & \\
125 & & & &
\end{array}$$

$$z = 1 + (19 \times 7) + 19.\frac{18}{2}.12 + 19.\frac{18}{2}.\frac{17}{3}.6$$

$$= 1 + 133 + 2052 + 5814 = 8000.$$

Theor. 2. In any series of equidistant terms, a, b, c, d, &c. whose first differences are small; to find any term wanting in that series, having any number of terms given. Take the equation which stands against the number of given terms, in the following table; and by reducing the equation, that term will be found.

No.	Equations.
1	$a-b=0$
2	$a-2b+c=0$
3	$a-3b+3c-d=0$
4	$a-4b+6c-4d+e=0$
5	$a-5b+10c-10d+5e-f=0$
6	$a-6b+15c-20d+15e-6f+g=0$
	&c. &c.
n	$a-nb+n.\frac{n-1}{2}c-n.\frac{n-1}{2}.\frac{n-2}{3}d$
	&c. $=0$.

where it is evident that the coefficients in any equation, are the unciæ of a binomial $1+1$ raised to the power denoted by the number of the equation.

Ex. Given the logarithms of 101, 102, 104, and 105; to find the log. of 103.

Here are 4 quantities given; therefore we must take the 4th equation $a-4b+6c-4d+e=0$, in which it is the middle quantity or term c that is to be found, because 103 is in the middle among the numbers 101, 102, 104, 105; then that equation gives the value of c as follows, viz.

$$c = \frac{4.\overline{b+d} - \overline{a+e}}{6}.$$

Now the logs. of the given numbers will be thus:

$$\begin{array}{lrl}
 & 2{\cdot}0043214 & = a \\
 & 2{\cdot}0086002 & = b \\
 & 2{\cdot}0170333 & = d \\
 & 2{\cdot}0211893 & = e \\
\hline
 & 4{\cdot}0256335 & = b+d \\
 & 4 & \\
\hline
 & 16{\cdot}1025340 & = 4.\overline{b+d} \\
\text{subtr.} & 4{\cdot}0255107 & = \quad a+e \\
\hline
 & 6)12{\cdot}0770233 & \\
 & 2{\cdot}0128372 & \text{the log. of 103.}
\end{array}$$

Theor. 3. When the terms a, b, c, d, &c. are at unequal distances from each other; to find any intermediate one of these terms, the rest being given.

Let p, q, r, s, &c. be the several distances of those terms from each other; then let

$$\begin{array}{llll}
B = \frac{b-a}{p}, & C = \frac{B1-B}{p+q}, & D = \frac{C1-C}{p+q+r}, & E = \frac{D1=D}{p+q+r+s} \\
B1 = \frac{c-b}{q}, & C1 = \frac{B2-B1}{q+r}, & D1 = \frac{C2-C1}{q+r+s}, & \\
B2 = \frac{d-c}{r}, & C2 = \frac{B3-B2}{r+s}, & & \\
B3 = \frac{e-d}{s}, & & & \\
\text{\&c.} & \text{\&c.} & \text{\&c.} &
\end{array}$$

Then the term z, whose distance from the beginning is x, will be

$$z = a + Bx + Cx\,.\,\overline{x-p} + Dx\,.\,\overline{x-p}\,.\,\overline{x-p-q} + Ex\,.\,\overline{x-p}\,.\,\overline{x-p-q}\,.\,\overline{x-p-q-r} + \&c.$$

to be continued to as many terms as there are terms in the given series.

By this series may be found the place of a comet, or the sun, or any other object at a given time; by knowing the places of the same for several other given times.

Other methods of Interpolation may be found in the Philos. Trans. number 362; or Stirling's Summation and Interpolation of Series. See also Briggs's Arithmetica Logarithmica, and Trigonometria Britannica, where the Method of Interpolation by Differences was first applied to the calculation of Logarithms.

INTERPOLA'TOR. *s.* (Latin.) One that foists in counterfeit passages (*Swift*).

INTERPO'SAL. *s.* (from *interpose.*) 1. Interposition; agency between two persons (*South*). 2. Intervention (*Glanville*).

To INTERPO'SE. *v. a.* (*interpono*, Lat.) 1. To place between; to make intervenient (*Bacon*). 2. To thrust in as an obstruction, interruption, or inconvenience (*Swift*). 3. To offer as a succour or relief (*Woodw.*)

To INTERPO'SE. *v. a.* 1. To mediate; to act between two parties. 2. To put in by way of interpretation (*Boyle*).

INTERPO'SER. *s.* (from *interpose.*) 1. One that comes between others (*Shak.*) 2. An intervenient agent; a mediator.

INTERPOSI'TION. *s.* (*interpositio*, Lat.) 1. Intervenient agency (*Atterbury*). 2. Mediation; agency between parties (*Add.*) 3. Intervention; state of being placed between two (*Raleigh*). 4. Any thing interposed (*Milton*).

To INTE'RPRET. *v. a.* (*interpretor*, Lat.) To explain; to translate; to decipher; to give a solution to (*Daniel*).

INTE'RPRETABLE. *a.* (from *interpret.*) Capable of being expounded (*Collier*).

INTERPRETA'TION. *s.* (*interpretatio*, Lat.) 1. The act of interpreting; explanation (*Shak.*) 2. The sense given by an interpreter; exposition (*Hooker*). 3. The power of explaining (*Bacon*).

INTE'RPRETATIVE. *a.* (from *interpret.*) Collected by interpretation (*Hammond*).

INTE'RPRETATIVELY. *ad.* As may be collected by interpretation (*Ray*).

INTE'RPRETER. *s.* (*interpres*, Latin.) 1. An expositor; an expounder (*Burnet*). 2. A translator (*Sherburne*).

INTERPU'NCTION. *s.* (*interpungo*, Lat.) Pointing between words or sentences.

INTERRE'GNUM. *s.* (Latin.) The time in which a throne is vacant between the death of a prince and accession of another (*Cowley*).

INTERRE'IGN. *s.* (*interregne*, French, *interregnum*, Latin.) Vacancy of the throne (*Bacon*).

To INTE'RROGATE. *v. a.* (*interrogo*, Lat.) To examine; to question.

To INTE'RROGATE. *v. n.* To ask; to put questions (*Hammond*).

INTERROGA'TION. *s.* (*interrogatio*, Lat.) 1. The act of questioning. 2. A question put; an inquiry (*Pope*). 3. A note that marks a question: thus ?

INTERRO'GATIVE. *a.* (*interrogativus*, Lat.) Denoting a question; expressed in a questionary form of words.

INTERRO'GATIVE. *s.* A pronoun used in asking questions: as, who? what?

INTERRO'GATIVELY. *ad.* In form of a question.

INTERROGA'TOR. *s.* (from *interrogate.*) An asker of questions.

INTERRO'GATORY. *s.* (*interrogatoire*, Fr.) A question; an inquiry (*Shakspeare*).

INTERRO'GATORY. *a.* Containing a question; expressing a question.

To INTERRU'PT. *v. a.* (*interruptus*, Lat.) 1. To hinder the process of any thing by breaking in upon it (*Hale*). 2. To hinder one from proceeding by interposition (*Ecclesiasticus*). 3. To divide; to separate.

INTERRU'PT. *a.* Containing a chasm (*Milton*).

INTERRUPTED CADENCE, in music, one in which the bass instead of falling or rising from the fifth to the key note, passes to some other, and interrupts the full close.

INTERRUPTED PROPORTION, the same as DISCRETE PROPORTION: as in the case 6:8::3:4.

INTERRUPTED SPIKE, in botany. *Interrupta spica.* A broken spike. Divided by intervals of smaller flowers. As in *Mentha spicata.*

INTERRUPTEDLY. *ad.* (from *interrupted.*) Not in continuity; not without stoppages (*Boyle*).

INTERRU'PTER. *s.* (from *interrupt.*) He who interrupts.

INTERRU'PTION. *s.* (*interruptio*, Lat.) 1. Interposition; breach of continuity (*Hale*). 2. Intervention; interposition (*Dryden*). 3. Hinderance; stop; let; obstruction (*Shak.*) 4. Intermission (*Addison*).

INTERSCA'PULAR. *a.* (*inter* and *scapula*, Lat.) Placed between the shoulders.

INTERSCENDENT QUANTITIES, in Algebra, such whose exponents are radical quantities: as

$$x^{\sqrt{2}},\ x^{\sqrt{a}}.$$

To INTERSCI'ND. *v. a.* (*inter* and *scindo*, Lat.) To cut off by interruption.

To INTERSCRI'BE. *v. a.* (*inter* and *scribo*, Lat.) To write between.

INTERSE'CANT. *a.* (*intersecans*, Lat.) Dividing any thing into parts.

To INTERSE'CT. *v. a.* (*interseco*, Latin.) To cut; to divide each other mutually (*Brown*).

To INTERSE'CT. *v. n.* To meet and cross each other (*Wiseman*).

INTERSE'CTION. *s.* (*intersectio*, Latin.) Point where lines cross each other (*Bentley*).

To INTERSE'RT. *v. a.* (*intersero*, Latin.) To put in between other things (*Brerewood*).

INTERSE'RTION. *s.* (from *intersert.*) An insertion, or thing inserted between any thing (*Hammond*).

To INTERSPE'RSE. *v. a.* (*interspersus*, Lat.) To scatter here and there among other things (*Swift*).

INTERSPE'RSION. *s.* (from *intersperse.*) The act of scattering here and there (*Watts*).

INTERSPINA'LES Colli, (*Interspinales musculi*, from *inter*, between, and *spina*, the spine). The fleshy portions between the spinous processes of the neck, that draw these processes nearer to each other.

Interspina'les dorsi et lumborum. These are rather small tendons than muscles that connect the spinal and transverse processes.

INTERSTE'LLAR. *a.* (*inter* and *stella*, Lat.) Intervening between the stars (*Bacon*).

I'NTERSTICE. *s.* (*interstitium*, Latin.) 1. Space between one thing and another (*Ash*). 2. Time between one act and another (*Ayliffe*).

INTERSTI'TIAL. *a.* (from *interstice.*) Containing interstices (*Brown*).

INTERTE'XTURE. *s.* (*intertexo*, Lat.) Diversification of things mingled or woven one among another.

INTERTIES, in architecture, small pieces of timber which lie horizontally between the summers.

INTERTRANSVERSALES Lumborum. Four distinct small bundles of flesh, which fill up the spaces between the transverse processes of the vertebræ of the loins, and serve to draw them towards each other.

INTERTRIGO, (*Intertrigo, ginis*, f. from *inter*, between, and *tero*, to rub). An excoriation about the anus, groins, axilla, or other parts of the body, attended with inflammation and moisture. It is most commonly produced by the irritation of the urine, from riding, or some acrimony in children, and by the Greeks was denominated Ecdora.

To INTERTWI'NE. } *v. a.* (*inter* and
To INTERTWI'ST. } *twine*, or *twist.*)
To unite by twisting one in another (*Milton*).

I'NTERVAL. *s.* (*intervallum*, Latin.) 1. Space between places; interstice; vacuity; space unoccupied; void place; vacancy; vacant place (*Newton*). 2. Time passing between two assignable points (*Swift*). 3. Remission of a delirium or distemper (*Atterbury*).

INTERVAL, in music, the difference of two sounds with respect to acuteness and gravity; or, that imaginary space terminated by two sounds which differ in acuteness or gravity. The distance between any given sound and another, strictly speaking, is measured neither by any common standard of extension or duration; but either by immediate sensation, or by computing the difference between the numbers of vibrations produced by two or more sonorous bodies, in the act of sounding, during the same given time. As the vibrations are slower and fewer during the same instant, for example, the sound is proportionally lower or graver; on the contrary, as during the same period the vibrations increase in number and velocity, the sounds are proportionably higher or more acute. An interval in music, therefore, is properly the difference between the number of vibrations produced by one sonorous body of a certain magnitude and texture, and of those produced by another of a different magnitude and texture in the same time. Taking the word in its more general sense, we must allow that the possible intervals of sound are infinite, but we only speak of those intervals which exist between the different tones of any established system. The ancients divided the intervals into simple, or uncomposite, which they call diastems, and composite intervals, which they call systems. The least of all the practical intervals in the Greek music was, according to Bacchius, the enharmonic diesis or fourth of a tone; but our scale does not notice so small a division, since all our tones concur in consonances, to which order only one of the three ancient genera, viz. the diatonic, was accommodated.

The ancients were extremely divided as to the measuring of intervals: Pythagoras and his followers measured them by the ratios of numbers; they supposed the difference of gravity and acuteness to depend on the different velocities of the motions that cause sound; and thought therefore that they could only be accurately measured by the ratios of those velocities; which ratios were first investigated by Pythagoras, on occasion of his passing by a smith's shop, and observing a concord between the sound of the hammers striking on the anvil. Aristoxenus opposed this; he thought reason and mathematics had nothing to do in the case, and that sense was the only judge in the dispute; the other being too subtil to be of any use. He therefore determined the octave, fifth, and fourth, which he thought the most simple concords, by the ear; and by the difference of the fourth and fifth, he found out the tone, which he settled as an interval the ear could judge of: he also measured every

interval by various additions and abstractions made with those mentioned one with another. Ptolemy kept a middle way between the two: he found fault with the one for despising reason, and with the other for excluding sense; and shewed how these two might mutually assist each other in this matter.

INTERVALS are divided into *consonant*, and *dissonant;* the former are such whose extreme sounds when heard simultaneously are agreeable to the soul; the latter, on the contrary, produce disagreeable sensations. Intervals are also divided into *enharmonic, chromatic*, and *diatonic;* an enharmonic interval, is the difference of a major and minor semitone; expressed by the ratio 81 : 80. A chromatic interval consists properly of a minor semitone, but may also admit the major, their ratios are 25 : 24 and 16 : 15. A diatonic interval consists of a semitone-major at least, but may consist of any number of tones within the octave. Intervals, again, are either *simple* or *compound:* modern musicians consider the semitone as a simple interval; and an interval which contains two or more semitones, a compound one.

The octave is commonly divided into its component intervals, by means of certain proportions resulting from combinations of the numbers 2, 3, and 5; which are given under the article MONOCHORD. But in this method of division, the simpler intervals have unequal ratios in different positions of the octave; the tones, for instance, being sometimes expressed by $\frac{8}{9}$ at others by $\frac{9}{10}$. It has, therefore, been thought proper to divide the octave into its component intervals by an *Isotonic* scale of equal parts, and by a comparison of the numbers thus found, with the common division to determine the greatest errors. For the isotonic divisions of the octave, the rule is, to find as many geometrical means between 1 and $\frac{1}{2}$ as there are semitones between the two extremes, viz. 11; these means will be the ratios sought. They are as follow: fundamental, 1·00000; minor second, ·94387; major second, ·89090; minor third, ·84090; major third, ·79370; fourth, ·74915; major fourth, ·70711; fifth, ·66742; minor sixth, ·62996; major sixth, ·59460: minor seventh, ·56123; major seventh, ·52973; octave, ·50000. By comparing these with the common divisions, it appears that the differences or errors are, in general, quite minute; but that the greatest are at the minor third, and major sixth, where they are equivalent to $\frac{1}{13}$ of a tone. These errors, though small, produce very disagreeable effects, and give a widely different character to the same composition when performed in different keys; those concords being found imperfect in one key which were perfect in another: hence, it has been found necessary to *temper* the concords and other intervals, either by an *isotonic* division, or by some other expedient. See TEMPERAMENT.

To INTERVE'NE. *v. n.* (*intervenio,* Lat.) 1. To come between things or persons. 2. To make intervals (*Milton*). 3. To cross unexpectedly (*Taylor*).

INTERVE'NE. *s.* (from the verb.) Opposition, or perhaps interview; out of use (*Wotton*).

INTERVE'NIENT. *a.* (*interveniens,* La.) Intercedent; interposed; passing between (*Bacon*).

INTERVE'NTION. *s.* (*interventio,* Latin.) 1. Agency between persons (*Atterbury*). 2. Agency between antecedents and consecutives (*L'Estrange*). 3. Interposition; the state of being interposed (*Holder*).

To INTERVE'RT. *v. a.* (*interverto,* Lat.) 1. To turn to another course (*Wotton*). 2. To turn to another use.

INTERVI'EW. *s.* (*entrevue,* French.) Mutual sight; sight of each other (*Hooker*).

To INTERVO'LVE. *v. a.* (*intervolvo,* Lat.) To involve one within another (*Milton*).

To INTERWE'AVE. *v. a.* pret. *interwove,* part. pass. *interwoven, interwove,* or *interweaved.* (*inter* and *weave.*) To mix one with another in a regular texture; to intermingle (*Milton*).

To INTERWI'SH. *v. a.* (*inter* and *wish.*) To wish mutually to each other (*Donne*).

INTE'STABLE. *a.* (*intestabilis,* Lat.) Disqualified to make a will (*Ayliffe*).

INTE'STATE. *a.* (*intestatus,* Latin.) Wanting a will; dying without a will (*Dryden*).

INTESTI'NA. In zoology, the first order of the class vermes or worms, possessing a formation the most simple, and some of them living within other animals, some in waters, and a few in the earth: all of them perhaps active in prosecuting physical effects eventually beneficial; and many of them producing results that are obviously so. Thus the Gordius perforates clay to give a passage to springs and waters; the Lumbricus pierces the earth, that it may be exposed to the action of the air and moisture; the Teredo penetrates wood, and the Phloas and Mytilus rocks, to effect their dissolution.

INTESTI'NAL. *a.* (*intestinal,* French, from *intestine.*) Belonging to the guts (*Arbuth.*)

INTE'STINE, *a,* (*intestin,* French; *intestinus,* Latin.) 1. Internal; inward; not external (*Duppa*). 2. Contained in the body (*Milton*). 3. Domestic; not foreign (*Pope*).

INTE'STINES, (*Intestīna, ōrum,* n. pl. from *intus,* within). The convoluted membranous tube that extends from the stomach to the anus; receives the ingested food, retains it a certain time; mixes with it the bile and pancreatic juices; propels the chyle into the lacteals (perhaps digests the chyme into chyle,) and covers the fæces with mucus. They are situated in the cavity of the abdomen, and are divided into small and large, which have, besides their size, other cir-

cumstances of distinction. The small intestines are supplied internally with folds, called *valvulæ conniventes*, and have no bands on their external surface. The large intestines have no folds internally, and are supplied externally with three strong muscular bands, which run parallel upon the surface, and give the intestines a saccated appearance; and they have also small fatty appendages, called *appendiculæ epiploicæ*. The first portion of the intestinal tube, for about the extent of twelve fingers breadth, is called the *duodenum*; it lies in the epigastric region; makes three turnings, and between the first and second flexure receives, by a common opening, the pancreatic duct, and the ductus communis choledochus. It is in this portion of the intestines that chylification is chiefly performed. The remaining portion of the small intestines is distinguished by an imaginary division into the jejunum and ileum. The *jejunum*, which commences where the duodenum ends, is situated in the umbilical region, and is mostly found empty; hence its name: it is every where covered with red vessels, and about an hour and an half after a meal, with lacteals. The *ileum* occupies the hypogastic region and the pelvis; is of a more pallid colour than the former, and terminates by a transverse opening into the large intestines, which is called the *valve of the ileum*, *valve of the cæcum*, *or the valve of Tulpius*. The beginning of the large intestines is firmly tied down in the right iliac region, and for the extent of about four fingers breadth is called the *cæcum*, having a worm-like process adhering to it, called the *processus cæci vermiformis*, or *appendicula cæci vermiformis*. The great intestine then assumes the name of *colon*, ascends towards the liver, passes across the abdomen under the stomach to the left side, where it is contorted like the letter *S*, and descends to the pelvis; hence it is divided in this course into the *ascending portion*, *the transverse arch*, and the *sigmoid flexure*. When it has reached the pelvis it is called the *rectum*, under which denomination it proceeds in a straight line to the anus.

The intestinal canal is composed of three membranes or coats, a common one from the peritonium, a mucular coat, and a villous coat, the vills being formed of the fine terminations of arteries and nerves, and the origins of lacteals and lymphatics. The intestines are connected to the body by the mysentery; the duodenum has also a peculiar connecting cellular substance, as has likewise the colon and rectum, by whose means the former is firmly accreted to the back, the colon to the kidneys, and the latter to the os coccygis, and in women, to the vagina. The remaining portion of the tube is loose in the cavity of the abdomen. The arteries of this canal are branches of the superior and inferior misenteric, and the duodenal. The The veins evacuate their blood into the vena portæ. The nerves are branches of the eighth pair and intercostals. The lacteal vessels, which originate principally from the jejunum, proceed to the glands in the mesentery.

To INTHRA'LL. *v. a.* (*in* and *thrall.*) To enslave; to shackle; to reduce to servitude (*Prior*).

INTHRA'LMENT. *s.* (from *inthrall.*) Servitude; slavery (*Milton*).

To INTHRO'NE. *v. a.* (*in* and *throne.*) To raise to royalty; to seat on a throne (*Thoms.*)

I'NTIMACY. *s.* (from *intimate.*) Close familiarity (*Rogers*).

I'NTIMATE. *a.* (*intimus*, Latin.) 1. Inmost; inward; intestine (*Tillotson*). 2. Near; not kept at distance (*South*). 3. Familiar; closely acquainted (*Roscommon*).

I'NITIMATE. *s.* (*intime*, French; *intimus*, Latin.) A familiar friend; one who is trusted with our thoughts (*Gov. of the Tongue*).

To I'NTIMATE. *v. a.* (*intimer*, French.) To hint; to point out indirectly, or not very plainly (*Locke*).

I'NTIMATELY. *ad.* (from *intimate.*) 1. Closely; with intermixture of parts (*Arbuth.*) 2. Nearly; inseparably (*Addison*). 3. Familiarity; with close friendship.

INTIMA'TION. *s.* (from *intimate.*) Hint; obscure or indirect declaration or direction (*Addison*).

I'NTIME. *a.* Inward; being within the mass; internal: not used (*Digby*).

To INTI'MIDATE. *v. a.* (*intimider*, Fr.) To make fearful; to dastardize; to make cowardly (*Young*).

INTI'RE. *a.* (*entier*, French; see ENTIRE.) Whole; undiminished; unbroken (*Hooker*).

INTIRE or *Entire*, in botany, opposed to jagged. Exemplified in Genipa.—Intire stem. Simplicissimus, ramis vix ullis (*Philos. Bot.*) —Simplicissimus, ramis angustatitis.—(*Delin. Pl.*) where Simplicimus is explained by ramis vix ullis.—In Philosophical Botany, intire is a species of the Simple; and means, that the stem is continued in one unbroken series from top to bottom—that is, has no branches. Very entire or intire leaf, integerrimum folium. A leaf quite or absolutely entire. Cujus margo extimus integer absque omni crena est (*Philos. Bot.*)—Ipso margine lineari, nec minimum secto (*Delin. Pl.*) Having the margin or edge entire, without any notches—or, without being in the least cut. Intire therefore refers only to such sinuations as extend far into the disk of the leaf; and a leaf may be intire, although the edge be indented.

INTI'RENESS. *s.* (from *intire.*) Wholeness; integrity (*Donne*).

I'NTO. *prep.* (*in* and *to.*) 1. Noting entrance with regard to place; he went *into* the house (*Wotton*). 2. Noting penetration beyond the outside; moisture sinks *into* the body (*Pope*). 3. Noting a new state to which any thing is brought by the agency of a cause: he was brought *into* danger by rashness (*Boyle*).

INTO'LERABLE. *a.* (*intolerabilis*, Latin.) 1. Insufferable; not to be endured; not to be born (*Taylor*). 2. Bad beyond sufferance.

INTO'LERABLENESS. *s.* Quality of a thing not to be indured.

INTO'LERABLY. *ad.* (from *intolerable.*) To a degree beyond endurance.

INTO'LERANT. *a.* (*intolerant*, French.) Not enduring; not able to endure (*Arbuth.*)

To INTO'MB. *v. a.* (*in* and *tomb.*) To enclose in a funeral monument; to bury (*Dryden*).

To I'NTONATE. *v. a.* (*intono*, Latin.) To thunder.

INTONA'TION. *s.* (*intonation*, French from *intonate.*) The act of thundering.

INTONA'TION, in music, relates both to the consonance and to the strength or weakness of sounds. Intonation not only includes the act of tuning, but the giving to the tones of the voice or instrument that occasional impulse, swell, and decrease, on which in a great measure, all impression depends. A good intonation is one of the first qualifications in the higher walks of execution.

To INTO'NE. *v. n.* (from *tone.*) To make a slow protracted noise (*Pope*).

INTORSION. In botany (*intorsio.*) Flexio partium versus alterum latus (*Philos. Bot.*)—In Delin. Pl. it is called Torsio, and is thus explained. Directio plantæ in unam alteramve plagam a verticali diversam.—The writhing, bending, turning, twining or twisting of any part in a vegetable towards one side or other—or, in any direction from the vertical. Thus the stem in some plants twines from right to left; as in Tamus, Dioscorea, Rajania, Menispermum, Cissampelos, Hippocratea, Lonicera, Humulus, Helxine.—In others from left to right; as in Phaseolus, Dolichos, Clitoria, Glycine, Securidaca, Convolvulus, Ipomæa, Cynanche, Periploca, Ceropegia, Euphorbia, Tragia, Basella, Eupatorium, Tournefortia. It is also applied to the Clasper or Tendril; as in Leguminous plants, Vine, Bryony. In this last it is observed by Grew, that the tendril having made two or three turns one way, is then directed the contrary way, in order to be more sure of its hold. To the corol which twists to the left in Asclepias, Nerium, Vinca, Rauwolfia, Periploca, Stapelia—to the right in Pedicularis, Trientalis, Gentiana.—It is applied also to the Pistil and Germ—to the Spike—to the Awn, as in the Wild Oat—to the beak of the seed, as in Geranium—to the peduncle, as in Mnium hygrometricum.—When we speak of right and left, we suppose the spectator to have his face turned towards the south. See TWINING.

To INTO'RT. *v. a.* (*intortuo*, Latin.) To twist; to wreath; to wring (*Pope*).

To INTO'XICATE *v. a.* (*in* and *toxicum*, Latin.) To inebriate; to make drunk (*Bac.*)

INTOXICA'TION. *s.* (from *intoxicate.*) Inebriation; ebriety; the act of making drunk; the state of being drunk (*South*).

INTRA'CTABLE. *a.* (*intractabilis*, Latin.) 1. Ungovernable; violent; stubborn; obstinate (*Rogers*). 2. Unmanageable; furious (*Woodward*).

INTRA'CTABLENESS. *s.* Obstinacy; perverseness.

INTRA'CTABLY. *ad.* (from *intractable.*) Unmanageably; stubbornly.

INTRADOS, in architecture, the interiour curve of an arch; or that curve which is formed by the lower faces of the arch-stones.

INTRAFOLIACEOUS stipules. INTRAFOLIACEÆ *stipulæ.* Growing above or within the leaves of a plant.

INTRANQUI'LLITY. *s.* (*in* and *tranquillity.*) Unquietnesss; want of rest (*Temp.*)

INTRANSMU'TABLE. *a.* (*in* and *transmutable.*) Unchangeable to any other substance (*Ray*).

To INTREA'SURE. *v. a.* (*in* and *treasure.*) To lay up as in a treasury (*Shakspeare*).

To INTRE'NCH. *v. n.* (*in* and *trencher*, French.) To invade; to encroach; to cut off part of what belongs to another (*Dryden*).

To INTRE'NCH. *v. a.* 1. To break with hollows (*Milton*). 2. To fortify with a trench: as, the allies were intrenched in their camp.

INTRE'NCHANT. *a.* Not to be divided; not to be wounded; indivisible (*Shakspeare*).

INTRE'NCHMENT. *s.* (from *intrench.*) Fortification with a trench.

INTRE'PID. *a.* (*intrepede*, French; *intrepidus*, Latin.) Fearless; daring; bold; brave (*Thom.*)

INTREPI'DITY. *s.* (from *intrepidité*, Fr.) Fearlesness; courage; boldness (*Swift*).

INTRE'PIDLY. *ad.* (from *intrepid.*) Fearlessly; daringly (*Pope*).

I'NTRICACY. *s.* (from *intricate.*) State of being entangled; perplexity; involution; complication of facts or notions (*Addison*).

I'NTRICATE. *a.* (*intricatus*, Latin.) Entangled; perplexed; involved; complicated; obscure (*Addison*).

To I'NTRICATE. *v. a.* (from the adjective.) To perplex; to darken: not proper, nor in use (*Camden*).

I'NTRICATELY. *ad.* (from *intricate.*) With involution of one in another; with perplexity (*Swift*).

I'NTRICATENESS. *s.* (from *intricate.*) Perplexity; involution; obscurity (*Sidney*).

INTRI'GUE. *s.* (*intrigue* French.) 1. A plot; a private transaction in which many parties are engaged (*Addison*). 2. Intricacy; complication (*Hale*). 3. The complication or perplexity of a fable or poem; artful involution of feigned transaction (*Pope*).

To INTRI'GUE. *v. n.* (*intriguer*, French.) To form plots; to carry on private designs.

INTRI'GUER. *s.* (*intriguer*, French.) One who busies himself in private transactions;

one who forms plots; one who pursues women (*Addison*).

INTRI'GUINGLY. *ad.* (from *intrigue.*) With intrigue; with secret plotting.

INTRI'NSECAL. *a.* (*intrinsecus*, Latin.) 1. Internal; solid; natural; not accidental; not merely apparent (*Bentley*). 2. Intimate; closely; familiar; not used (*Wotton*).

INTRI'NSECALLY. *ad.* 1. Internally; naturally; really (*South*) 2. Within; at the inside (*Wotton*).

INTRI'NSECATE. *a.* Perplexed; entangled: not in use (*Shakspeare*).

INTRI'NSIC. *a.* (*intrinsecus*, Latin.) 1. Inward; internal; real; true (*Hammond*). 2. Not depending on accident; fixed in the nature of the thing (*Rogers*).

To INTRODU'CE. *v. a.* (*introduco*, Latin.) 1. To conduct or usher into a place, or to a person (*Locke*). 2. To bring something into notice or practice (*Brown*). 3. To produce; to give occasion to (*Locke*). 4. To bring into writing or discourse by proper preparatives.

INTRODU'CER. *s.* (from *introduce.*) 1. One who conducts another to a place or person. 2. Any one who brings any thing into practice or notice (*Wotton*).

INTRODU'CTION. *s.* (*introductio*, Latin.) 1. The act of conducting or ushering to any place or person; the state of being ushered or conducted. 2. The act of bringing any new thing into notice or practice (*Clarendon*). 3. The preface or part of a book containing previous matter.

INTRODU'CTIVE. *a.* (*introductif*, Fr.) Serving as means to something else (*South*).

INTRODUCTOR, in antiquity, the officer who introduced the Athletiœ to the Stadium.

INTRODU'CTORY. *a.* (from *introductus*, Latin.) Previous; serving as conveyance to something further (*Boyle*).

INTROGRE'SSION. *s.* (*introgressio*, Lat.) Entrance; the act of entering.

INTRO'IT. *s.* (*introit*, French.) The begining of the mass; the beginning of public devotions.

INTROMI'SSION. *s.* (*intromissio*, Latin.) The act of sending in (*Peacham*).

To I'NTROMIT. *v. a.* (*intromitto*, Latin.) 1. To send in; to let in; to admit. 2. To allow to enter; to be the medium by which any thing enters (*Newton*).

To INTROSPE'CT. *v. a.* (*introspectus*, Lat.) To take a view of the inside.

INTROSPE'CTION. *s.* (from *introspect.*) A view of the inside (*Dryden*).

INTROVE'NIENT. *a.* (*inter* and *venio*, Lat.) Entering; coming in (*Brown*).

To INTRU'DE. *v. n.* (*intrudo*, Latin.) 1. To come in unwelcome by a kind of violence; to enter without invitation or permission (*Watts*). 2. To encroach; to force in uncalled or unpermitted (*Colossians*).

To INTRUDE, *v. a.* To force without right or welcome (*Pope*).

INTRU'DER. *s.* (from *intrude.*) One who forces himself into company or affairs without right or welcome (*Addison*).

INTRU'SION *s.* (*intrusio*, Latin.) 1. The act of thrusting or forcing any thing or person into any place or state (*Locke*). 2. Encroachment upon any person or place; unwelcome entrance (*Wake*). 3. Voluntary and uncalled undertaking of any thing (*Wotton*).

To INTRU'ST. *v. a.* (*in* and *trust.*) To treat with confidence; to charge with any secret commission, or thing of value (*Arb.*)

INTUI'TION. *s.* (*intuitus*, Latin.) 1. Sight of any thing; immediate knowledge (*Government of the Tongue*). 2. Knowledge not obtained by deduction of reason, but instantaneously accompanying the ideas which are its object (*Glanville*).

INTU'ITIVE. *a.* (*intuitivus*, Lat) 1. Seen by the mind immediately (*Locke*). 2. Seeing, not barely believing (*Hooker*). 3. Having the power of discovering truth immediately without ratiocination (*Hooker*).

INTUI'TIVELY. *ad.* (*intuitivement*, Fr.) Without deduction of reason; by immediate perception (*Hooker*).

INTUME'SCENCE } *s.* (*intumescence*, Fr.
INTUME'SCENCY } *intumesco*, Latin.)
Swell; tumour (*Brown*).

INTURGE'SCENCE. *s.* (*in* and *turgesco*, Lat.) Swelling; the act or state of swelling (*Brown*).

INTU'SE. *s.* (*intusus*, Lat.) Bruise (*Spens.*)

Intus-susception, (*Intus-susceptio*, f. from *intus*, within, and *suscipio*, to receive). A disease of the intestinal tube, and most frequently of the small intestines; it consists in a portion of gut passing for some length within another portion.

INTYBUS, (*Intybus*, *i*, m. from *in*, and *tuba*, a hollow instrument so named from the hollowness of its stalk). See Endivia.

To INTWI'NE. *v. a.* (*in* and *twine.*) 1. To twist, or wreath together (*Hooker*). 2. To be inserted by being wreathed or twisted (*Dryden*).

To INVA'DE. *v. a.* (*invado*, Latin.) 1. To attack a country; to make a hostile entrance (*Knolles*). 2. To attack; to assail; to assault (*Shakespeare*). 3. To violate by the first act of hostility; to attack (*Dryden*).

INVA'DER. *s.* (from *invado*, Latin.) 1. One who enters with hostility into the possessions of another (*Bacon*). An assailant. 3. Encroacher; intruder (*Hammond*).

INVALE'SCENCE. *s.* (*invalesco*, Latin.) Strength; health; force.

INVA'LID. *a.* (*invalidus*, Latin.) Weak; of no weight or cogency (*Milton*).

Invalid, a person wounded, maimed, or disabled for action by age. At Chelsea and Greenwich are magnificent hospitals or colleges built for the reception and accommodation of invalids, or soldiers and seamen worn out in the service. We have also twenty independent companies of invalids,

dispersed in the several forts and garrisons; and there is a battalion of invalids belonging to the royal artillery.

To INVA'LIDATE. *v. a.* (from *invalid.*) To weaken; to deprive of force or efficacy.

INVALI'DE. *s.* (French.) One disabled by sickness or hurts (*Prior*).

INVALI'DITY. *s.* (*invalidité*, French.) 1. Weakness; want of cogency. 2. Want of bodily strength (*Temple*).

INVA'LUABLE. *a.* (*in* and *valuable.*) Precious above estimation; inestimable (*Atterb.*)

INVA'RIABLE. *a.* (*invariable*, French.) Unchangeable; constant (*Brown*).

INVA'RIABLENESS. *s.* (from *invariable.*) Immutability; constancy.

INVA'RIABLY. *ad.* (from *invariable.*) Unchangeably; constantly (*Atterbury*).

INVA'SION. *s.* (*invasio*, Latin.) 1. Hostile entrance upon the rights or possessions of another; hostile encroachment (*Dryden*). 2. Attack of a disease (*Arbuthnot*).

INVA'SIVE. *a.* (from *invade.*) Entering hostilely upon other men's possessions (*Dry.*)

INV'ECTED, in heraldry, denotes a thing fluted or furrowed.

INVE'CTIVE. *s.* (*invective*, French.) A censure in speech or writing; a reproachful accusation (*Hooker*).

INVE'CTIVE. *a.* (from the noun.) Satirical; abusive (*Dryden*).

INVE'CTIVELY. *ad.* Satirically; abusively.

To INVE'IGH. *v. a.* (*inveho*, Latin.) To utter censure or reproach (*Arbuthnot*).

INVE'IGHER. *s.* (from *inveigh.*) Vehement railer (*Wiseman*).

To INVE'IGLE. *v. a.* (*invogliare*, Italian.) To persuade to something bad or hurtful; to weedle; to allure; to seduce (*Hudibras*).

INVE'IGLER. *s.* (from *inveigle.*) Seducer; deceiver; allurer to ill (*Sandys*).

To INVE'NT. *v. a.* (*inventer*, French.) 1. To discover; to find out; to excogitate; to produce something not made before (*Arbuth.*) 2. To forge; to contrive falsely; to fabricate (*Stillingfleet*). 3. To feign; to make by the imagination (*Shaks.*) 4. To light on; to meet with; not used (*Spenser*).

INVE'NTER. *s.* (from *inventeur*, French.) 1. One who produces something new; a deviser of something not known before (*Garth.*) 2. A forger.

INVE'NTION. *s.* (*invention*, French.) 1. Excogitation; the act or power of producing something new (*Dryden*). 2. Discovery (*Ray*). 3. Forgery; fiction (*Shakspeare*). 4. The thing invented (*Milton*).

Inve'ntion, denotes the act of finding any thing new, or even the thing thus found. Thus we say, the invention of gunpowder, of printing, &c. The alcove is a modern invention owing to the Moors. The Doric, Ionic, and Corinthian orders are of Greek invention; the Tuscan and Composite of Latin invention. Janson ab Almeloveen has written an Onamisticon of inventions; wherein are shown, in an alphabetical order, the names of the inventors, and the time, place, &c. where they are made. Pancirollus has a treatise of old inventions that are lost, and new ones that have been made; Polydore Virgil has also published eight books of the inventors of things. De Inventoribus Rerum: and Professor Beckman a history of inventions. See Discovery.

Inve'ntion is also used for the finding of a thing hidden. The Romish church celebrates a feast on the 4th of May, under the title of Invention of the Holy Cross.

Inve'ntion is also used for subtilty of mind, or somewhat peculiar to a man's genius, which leads him to a discovery of things new.

Inve'ntion, in painting, is the choice which the painter makes of the objects that are to enter the composition of his piece. See Painting.

Inve'ntion, in poetry, is applied to whatever the poet adds to the history of the subject he has chosen; as well as to the new turn he gives it. See Poetry.

INVE'NTIVE. *a.* (*inventif*, French.) 1. Quick at contrivance; ready at expedients (*Ascham*). 2. Having the power of excogitation or fiction (*Raleigh*).

INVE'NTOR. *s.* (*inventor*, Latin.) 1. A finder out of something new (*Milton*). 2. A contriver; a framer (*Shakspeare*).

INVENTO'RIALLY. *ad.* (from *inventory*, whence perhaps *inventorial.*) In manner of an inventory (*Shakspeare*).

I'NVENTORY, in law, a catalogue, or schedule orderly made, of all a deceased person's goods and chattels, at the time of his death, with their value appraised by indifferent persons, which every executor or administrator is obliged to exhibit to the ordinary at such time as he shall appoint.

I'nventory, in trade, is a list or particular valuation of goods, &c.

To I'NVENTORY. *v. a.* (*inventorier*, Fr.) To register; to place in a catalogue (*Shaks.*)

INVE'NTRESS. *s.* (*inventrice*, Fr. from *inventor.*) A female that invents (*Burnet*).

INVERARY, a royal borough in Argyleshire, seated on the N. W. side of Loch Fyne. Lat. 56. 16 N. Lon. 5. 0. W.

INVERKEITHING, a borough in Fifeshire, situate on a bay of the Frith of Firth. It has a considerable trade in coal and other articles. Lat. 57. 0. N. Lon. 3. 25. W.

INVERLOCHY, an ancient castle in the neighbourhood of Fort William in Inverness-shire. It is adorned with large round towers; and, by the mode of building, seems to have been the work of the English in the time of Edward I. who laid large fines on the Scotch barons for the purpose of erecting new castles. The largest of these towers is called Cumin's. But long prior to these ruins, Inverlochy, according to Bocce, had been a place of great note, a most opulent city, remarkable for the vast resort of French and Spaniards, probably on account of trade. It was also a seat of the kings of Scotland.

INVERNESS, a seaport town of Scotland,

in the county of the same name, at the mouth of the river Ness. It is a royal borough, holding its first charter from Malcolm Canmore. The harbour is safe and commodious. Seven vessels belong to it, of 400 to 500 tons; and nine boats, manned by six men each. The vessels trade principally to London, carrying fish, skins, and the manufacture of the country, bringing back grocery, &c. The manufactures of the town are leather, coarse hempen cloth, bagging, sacking, &c. linen, and thread. The memorable battle of Culloden was fought near this town. There are three national or Presbyterian churches, besides one of Episcopalians, a place of worship for methodists, &c. The number of inhabitants in the year 1791, was 5107, besides 1823 in the parish, making in the whole 6930. In 1801, the number was 8732. Lat. 57. 34. N. Lon. 4. 10. W.

INVERNESS-SHIRE, a county of Scotland, bounded on the north by the county of Ross, on the east by the counties of Murray and Nairn, on the south by Perth and Argyle, and on the west by the sea. It is divided into three districts, Inverness-shire Proper, Lochaber, and Badenock; and includes several of the Hebrides, or Western Islands, viz. Skye, Barra, North and South Vist, Benbecula, St. Kilda, Rona, Rassa, Rum, and some others, with the peninsula of Harris. Independent of the islands, it measures seventy-five miles from east to west, and forty-five from north to south. It abounds with oak and fir timber, and mines of iron ore; the pastures feed numbers of cattle, and the lochs are well furnished with fish; but the corn produced is trifling: on the whole, it is reckoned one of the least fertile counties of Scotland. The principal rivers are the Ness and the Spey. In 1801 this county contained 74,292 inhabitants. Inverness is the capital.

Inverse *proportion.* See Rule *of three inverse.*

Inverse *ratio*, is that in which more requires less, or less requires more. As for instance, in the case of light, or heat from a luminous object, the light received is less at a greater distance, and greater at a less distance; so that here more, as to distance, gives less, as so light. This is usually expressed by the term inversely, or reciprocally; as in the case above, where the light is inversely, or reciprocally, as the square of the distance; or in the inverse or reciprocal duplicate ratio of the distance.

INVE'RSE. *a.* (*inverse*, French; *inversus*, Latin.) Inverted; reciprocal; opposed to direct.

INVE'RSION. *s.* (*inversion*, French; *inversio*, Latin.) 1. Change of order or time, so as that the last is first, and first last (*Dryden*). 2. Change of place, so that each takes the room of the other.

Inve'rsion *of proportion.* See Proportion.

Inve'rsion, in music, is a changed position either of a subject or of a chord. The inversion of a subject is produced by giving it a higher or lower situation among the several parts of a score, sometimes making it the bass, at other times the tenor, counter-tenor, or the treble. The inversion of a chord, is that changed position of its component parts with respect to its fundamental bass, by which, though the harmony remain the same, the intervals are varied, and the compound assumes another name. This inversion is sometimes effected by simply changing the bass: as in the chord of the seventh, if the fundamental bass be shifted to its third, the harmony is no longer called the chord of the seventh, but that of the fifth and sixth (*Busby*).

To INVE'RT. *v. a.* (*inverto*, Latin.) 1. To turn upside down; to place in contrary method or order to that which was before (*Watts*). 2. To place the last first (*Prior*). 3. To divert; to turn into another channel; to imbezzle; to convert (*Knolles*).

INVE'RTEDLY. *ad.* (from *inverted.*) In contrary or reversed order (*Derham*).

INVERURY, a borough in Aberdeenshire, situate on the fertile banks of the Don, 15 miles N. W. of Aberdeen.

To INVE'ST. *v. a.* (*investio* Latin.) 1. To dress; to clothe; to array (*Milton*). 2. To place in possession of a rank or office (*Hook. Clarendon*). 3. To adorn; to grace (*Shaks.*) 4. To confer; to give (*Bacon*). 5. To enclose; to surround so as to intercept succours or provisions.

INVE'STIENT. *a.* (*investiens*, Latin.) Covering; clothing (*Woodward*).

INVE'STIGABLE. *a.* (from *investigate.*) To be searched out; discoverable by rational disquisition (*Hooker*).

To INVE'STIGATE. *v. a.* (*investigo*, Lat.) To search out; to find out by rational disquisition (*Cheyne*).

INVESTIGA'TION. *s.* (*investigatio*, Latin.) 1. The act of the mind by which unknown truths are discovered (*Watts*). 2. Examination (*Pope*).

INVE'STITURE. *s.* (French.) 1. The right of giving possession of any manor, office, or benefice (*Raleigh*). 2. The act of giving possession.

INVE'STMENT. *s.* (*in* and *vestment.*) Dress, clothes; garment; habit (*Shaks.*)

INVE'TERACY. *s.* (*inveteratio*, Latin.) 1. Long continuance of any thing bad; obstinacy confirmed by time (*Addison*). 2. (In physic.) Long continuance of a disease.

INVE'TERATE. *a.* (*inveratus*, Latin.) 1. Old; long established (*Bacon*). 2. Obstinate by long continuance (*Swift*).

To INVE'TERATE. *v. a.* (*invetero*, Latin.) To fix and settle by long continuance (*Bacon*).

INVE'TERATENESS. *s.* (from *inveterate.*) Long continuance of any thing bad; obstinacy confirmed by time (*Brown*).

INVETERA'TION. *s.* (*inveteratio*, Latin.) The act of hardening or confirming by long continuance.

INVI'DIOUS. *a.* (*invidiosus*, Latin.) 1. Envious; malignant (*Evelyn*). 2. Likely to incur or to bring hatred (*Swift*).

INVI'DIOUSLY. *ad.* 1. Malignantly; enviously. 2. In a manner likely to provoke hatred.

INVI'DIOUSNESS. *s.* (from *invidious.*) Quality of provoking envy or hatred.

To INVI'GORATE. *v. a.* (*in* and *vigour.*) To endue with vigour; to strengthen; to animate; to enforce (*Addison*).

INVIGORA'TION. *s.* (from *invigorate.*) 1. The act of invigorating. 2. The state of being invigorated (*Norris*).

INVI'NCIBLE. *a.* (*invincible*, French.) Insuperable; unconquerable; not to be subdued (*Shakspeare*).

INVI'NCIBLENESS. *s.* Unconquerableness; insuperableness.

INVI'NCIBLY. *ad.* (from *invincible.*) Insuperably; unconquerably (*Milton*).

INVI'OLABLE. *a.* (*inviolable*, *French.*) 1. Not to be profaned; not to be injured (*Milton*). 2. Not to be broken (*Hooker*). 3. Insusceptible of hurt or wound (*Milton*).

INVI'OLABLY. *ad.* (from *inviolable.*) Without breach; without failure (*Sprat*).

INVI'OLATE. *a.* (*inviolatus*, Latin.) Unhurt; uninjured; unprofaned; unpolluted; unbroken (*Dryden*).

I'NVIOUS. *a.* (*invius*, Latin.) Impassable; untrodden (*Hudibras*).

To INVI'SCATE. *v. a.* (*in* and *viscus*, Lat.) To lime; to entangle in glutinous matter. (*Brown*).

INVISIBI'LITY. *s.* (*invisibilité*, Fr.) The state of being invisible; imperceptibleness to sight (*Ray*).

INVI'SIBLE. *a.* (*invisible*, Fr.) Not perceptible by the sight; not to be seen (*Sidney*).

INVISIBLE *Girl*. See GIRL.

INVI'SIBLY. *ad.* (from *invisible.*) Imperceptibly to the sight (*Denham*).

INVITA'TION. *s.* (*invitatio*, Latin.) The act of inviting, bidding, or calling to any thing with ceremony and civility (*Dryden*).

To INVI'TE. *v. a.* (*invito*, Latin.) 1. To bid; to ask to any place with intreaty and complaisance (*Swift*). 2. To allure; to persuade; to induce by hope or pleasure (*Bacon*).

To INVI'TE. *v. n.* To ask or call to any thing pleasing (*Milton*).

INVI'TER. *s.* (from *invite.*) He who invites (*Smalridge*).

INVI'TINGLY. *ad.* (from *inviting.*) In such manner as invites or allures (*Decay of Piety*).

INULA. Flea-bane. In botany a genus of the class syngenesia, order polygamia superflua. Receptacle naked; down simple: calyx imbricate; florets of the margin very numerous and linear; and others with two bristles at the base. Thirty-five species, chiefly European plants, many of Asia, some of America, and a very few of the Cape; four indigenous to the meadows, sea-coasts, or ditches of our own country. The chief are:

1. E. Helenium. Elecampane leaves, clasping, ovate, wrinkled, downy under;—calyx-scales ovate. Found in the meadows of our own country. The enula campana of the dispensaries in which it is known as a demulcent. The roots are a preserve still in fashion among our confectioners.

2. E. Dysenterica. Leaves clasping, arrow-shaped at the base, oblong, downy underneath, repand-toothed; stem downy, panicled; lateral branches longer than the top; calyx-scales setaceous, hairy. Found in the ditches of our own country: and formerly employed medicinally in diarrhœas and dysenteries.

3. E. Crithmoides. Golden sapphire leaves linear, fleshy, trienspidate at the top. Found on our own sea-coasts.

They are all perennials. The first species enumerated is often cultivated in gardens, propagated by seeds or offsets. The seeds should be sown in August soon after they are ripe: the offsets should have a but or eye, and be taken from the old roots in autumn as soon as the leaves begin to decay.

To INU'MBRATE. *v. a.* (*inumbro*, Latin.) To shade; to cover with shades.

IN'UNCTION. *s.* (*inunctus*, Latin.) The act of smearing or anointing (*Ray*).

IN'UNDATÆ. In botany, the name of the forty-fifth order in Linnéus's Fragments of a Natural Method; and the fifteenth of the Natural Orders in *Gen. Pl.*—Containing such plants as grow naturally in the water.

INUNDA'TION. *s.* (*inundatio*, Latin. 1. The overflow of waters; flood (*Dryden*). 2. A confluence of any kind (*Spenser*).

To I'NVOCATE. *v. a.* (*invoco*, Latin.) To invoke; to implore; to call upon; to pray to (*Milton*).

INVOCA'TION. *s.* (*invocatio*, Latin.) 1. The act of calling upon in prayer (*Hooker*). 2. The form of calling for the assistance or presence of any being (*Addison*).

I'NVOICE. *s.* (perhaps corrupted from the French *envoyez*, send.) A catalogue of the freight of a ship, or of the articles and price of goods sent by a factor.

To INVO'KE. *v. a.* (*invoco*, Latin.) To call upon; to implore; to pray to (*Sidney*).

INVOLU'CRE. In botany, (*involucrum*, from *involvo*, to wrap up.) Calyx (umbellæ) a flore remotus. A calyx remote from the flower; particularly in the umbel, but applied also to the whorl and other kinds of inflorescence.

INVOLU'CRE UNIVERSAL. In botany, placed at the origin of the universal umbel. —Partial, at the origin of the partial umbel. —Proper, placed beneath a single flower.

Involucres are one-leafed, &c. or many-leaved, according to the number of leaves of which they are composed, Monophylous, involucre, and polyphylous, &c.

A dimidiate or halved involucre, is an involucre deficient on one side.

INVOLU'CRED. In botany, having an involucre. As umbels, whorls, &c.

INVOLU'CRET. } A little or partial invo-
INVOLU'CEL. } lucre. Partial fence. Withering. As in umbellate plants and Euphorbia.

To INVO'LVE. *v. a.* (*involvo*, Latin.) 1. To inwrap; to cover with any thing circumfluent (*Dryden*). 2. To imply; to comprise (*Tillotson*). 3. To intwist; to join (*Milton*). 4. To take in; to catch (*Sprat*). 5. To entangle *Locke*). 6. To complicate; to make intricate (*Locke*). 7. To blend; to mingle together confusedly (*Milton*).

INVO'LUNTARILY. *ad.* (from *involuntary.*) Not by choice; not spontaneously.

INVO'LUNTARY. *a.* (*involontaire*, Fr.) 1. Not having the power of choice (*Pope*). 2. Not chosen; not done willingly (*Lock*).

INVOLU'TE. Figure or curve, is that which is traced out by the outer extremity of a string as it is folded or wrapped upon another figure, or as it is unwound from off it. The involute of a cycloid, is also a cycloid equal to the former, which was first discovered by Huygens, and by means of which he contrived to make a pendulum vibrate in the curve of a cycloid, and so, theoretically at least, vibrate always in equal times, whether the arch of vibration were great or small, which is a property of that curve.

INVOLU'TE FOLIATION, or *vernatin*. In botany, quum margines laterales (foliorum in gemma) utrinque introrsum spiraliter involvuntur. (*Philos. Bot.*) Foliorum lateribus utrinque spiraliter contortis versus superiorem paginam. (*Delin. Pl.*) When leaves within their bud have their edges rolled spirally inwards on both sides towards the upper surface. As in Lonicera, Euonymus, Pyrus, Populus, Viola, &c.

INVOLU'TION. *s.* (*involutio*, Latin.) 1. The act of involving or inwrapping. 2. The state of being entangled; complication (*Glanville*). 3. That which is wrapped round any thing (*Brown*).

INVOLU'TION, in arithmetic and algebra, the raising any quantity from its root, or original state, to any height or power assigned. The number 4, for instance, is thus raised:

4 or 4^1 or 4 . is the first power, or root.

4×4 or 4^2 or 16 ... is the second power, or square.

$4\times4\times4$ or 4^3 or 64 ... is the third power, or cube, &c.

Hence, in arithmetic, to find any power of a given root, or quantity, let the root be multiplied by itself a number of times which is one less than the number of the index; i. e. once multiplied for the second root, twice for the third root, thrice for the fourth root, &c.

In algebra we may notice two cases:

CASE I.—*When the quantity is simple.*

Rule.—Multiply the exponent of the letters by the index of the power required, and raise the coefficient to the same power.

Thus, the second power of a is $a^{1\times2}=a^2$; of $a^{\frac{3}{2}}$ is a^3

The third power of $2a^2$ is $8a^{2\times3}=8a^6$; of $a^{\frac{1}{2}}b^{\frac{2}{3}}$ is $a^{\frac{3}{4}}b^2$

For the multiplication would be performed by the continual addition of the exponents; and this multiplication of them is equivalent.

If the sign of the given quantity is $+$, all its powers must be positive. If the sign is $-$, then the powers whose exponents are even numbers are positive; and those whose exponents are odd numbers are negative.

This is obvious from the rule for the signs in multiplication.

CASE II.—*When the quantity is compound.*

Rule.—The powers must be found by a continual multiplication of the quantity by itself.

Thus, the square of $x+\frac{a}{2}$, found by multiplying it into itself, is $x^2+ax+\frac{a^2}{4}$. The cube is got by multiplying the square already found by the root, &c.

The involution of compound quantities is rendered much easier by the *binomial theorem*. See BINOMIAL.

To INU'RE. *v. a.* (*in* and *ure.*) To habituate; to make ready or willing by practice; to accustom (*Addison*).

INU'REMENT. *s.* (from *inure.*) Practice; habit; use; custom; frequency. (*Wot.*)

To INUR'N. *v. a.* (*in* and *urn.*) To intomb; to bury (*Shakspeare*).

INU'STION. *s.* (*inustio*, Latin.) The act of burning.

INU'TILE. *a.* (*inutile*, French, *inutilis*, Latin.) Useless; unprofitable (*Bacon*).

INUTI'LITY. *s. inutilitas*, Latin.) Uselessness; unprofitableness.

INVU'LNERABLE. *a.* (*invulnerable*, Fr.) Not to be wounded; secure from wound (*Shakspeare*).

To INWA'LL. *v. a.* To enclose or fortify with a wall (*Spenser*).

I'NWARD. } *ad.* (inpeaꞃd, Saxon.) 1. Toward the internal parts;
I'NWARDS. } within (*Bacon*). 2. With inflection or incurvity; concavely (*Dryden*). 3. Into the mind or thought (*Hooker*).

I'NWARD. *a.* 1. Internal; placed not on the outside but within (*Milton*). 2. Reflecting; deeply thinking (*Prior*). 3. Intimate; domestic; familiar (*Job.*) 4. Seated in the mind (*Shakspeare*).

I'NWARD. *s.* 1. Any thing within, generally the bowels. Seldom has this sense a singular (*Milton*). 2. Intimate; near acquaintance (*Shakspeare*).

I'NWARDLY. *ad.* (from *inward.*) 1. In the heart; privately (*Shakspeare*). 2. In the parts within; internally (*Arbuthnot*). 3. With inflection or concavity.

I'NWARDNESS. *s.* (from *inward.*) Intimacy; familiarity (*Shakspeare*).

To INWE'AVE, preter. *inwove* or *inweaved*, part. pass. *inwove* or *inwoven* (*in* and *weave.*) 1. To mix any thing in weaving, so that it forms part of the texture

(*Pope*). 2. To intertwine; to complicate (*Milton*).

To INWO'OD. *v. a.* (*in* and *wood.*) To hide in woods: not used (*Sidney*).

To INWRA'P. *v. a.* (*in* and *wrap.*) 1. To cover by involution; to involve (*Spenser*). 2. To perplex; to puzzle with difficulty or obscurity (*Bacon*). 3. To ravish; to transport (*Milton*).

INWRO'UGHT. *a.* (*in* and *wrought.*) Adorned with work (*Milton*).

To INWRE'ATH. *v. a.* (*in* and *wreath.*) To surround as with a wreath (*Milton*)

IO, in fabulous history, a daughter of Inachus, or, according to others, of Jasus, or Pirene, was priestess of Juno at Argos. Jupiter became enamoured of her; but Juno discovered him in the company of Io. Jupiter changed Io into a beautiful heifer, and the goddess obtained from her husband the animal, whose beauty she had condescended to commend. Juno commanded the hundred-eyed Argus to watch the heifer; but Jupiter, anxious for the situation of Io, sent Mercury to destroy Argus, and to restore her to liberty (*Vide* Argus). Io was now persecuted by Juno, who sent a malicious insect to torment her. She wandered over the earth, and crossed the sea, till at last she stopped on the banks of the Nile, still exposed to Juno's insect. Here Jupiter changed her into a woman, and she brought forth Epaphus. Afterwards she married Telegonus, king of Egypt or Osiris. After death, she received divine honours, and was worshipped under the name of Isis. According to Herodotus, Io was carried away by Phœnician merchants, who wished to make reprisals for Europa, who had been stolen from them by the Greeks.

JO'AB, the general of David, king of Israel, distinguished himself by his valour, and also by his cruelties. He treacherously slew Abner, and stabbed Absalom, the son of David. That monarch, in consideration of his services, did not punish him; but Solomon put him to death for taking part with Adonijah, B. C. 1014.

JOA'CHIMSHAL, a town of Upper Saxony, in the Ucker Marche of Brandenburg. Lat. 53. 2. N. Lon. 13. 42. E.

JO'AN of Arc, or the maid of Orleans, was a servant at an inn when John Duke of Bedford was regent of France for Henry VI. and laid siege to the city of Orleans. From a wish to deliver her country, and to restore her sovereign to his crown, she became enthusiastically courageous, and assumed the dress of a warrior. By her exertions and declarations she spirited the besieged to an active resistance, and in a few weeks forced the English to retire. She next conducted Charles through the midst of his enemies to Rheims, where he was crowned. After several gallant actions she was taken prisoner at the siege of Compeigne, and tried for sorcery at Rouen, where she was burnt alive in 1431, aged twenty-four, to the great disgrace of her enemies.

It may be proper to add, however, that in the opinion of many, Joan did not in fact undergo the horrid punishment to which she was condemned. An ingenious writer in the *Monthly Magazine* has shewn (perhaps satisfactorily) that when public commiseration had succeeded to a vindictive bigotry, a woman appeared at Metz who called herself Joan of Arc; that she was acknowledged as such by both her brothers; that she was married to a gentleman of the house of Amboise in 1436, and that her sentence was annulled in 1456. Indeed contemporary historians shew, that she was by some *unusual* contrivance, kept out of the reach and observation of even her executioners; and this circumstance, from which they concluded her sufferings must be much increased, might possibly be the contrivance which ensured her rescue.

JO'ANNA, St. See Hinzuan.

JO'B, or the Book of Job, a canonical book of the Old Testament, containing the narrative of a series of misfortunes, which happened to a man whose name was Job, as a trial of his virtue and patience; together with the conferences he had with his cruel friends on the subject of his misfortunes: and the manner in which he was restored to ease and happiness. This book is filled with those noble, bold, and figurative expressions, which constitute the very soul of poetry.

Many of the Jewish rabbins pretend, that this relation is altogether a fiction; others think it a simple narrative of a matter of fact, just as it happened; while a third sort of critics own the ground-work of the story to be true, but that it is written in a poetical strain, and decorated with peculiar circumstances, to render the narration more profitable and entertaining.

See an express dissertation on the book of Job, in Bishop Warburton's Divine Legation of Moses, vol. ii. The bishop is of opinion that this book is a dramatic poem, written by Ezra, some time between the return of the Jews from the captivity of Babylon, and their thorough settlement in their own country, and adapted to the circumstances of these times, by being made allegorical as well as dramatic: thus, Job, who is supposed to have been a real person, that lived a generation or two before Moses, is designed to personate the Jewish people; his three friends, the three great enemies of the Jews, Sanballat, Tobiah, and Geshem, who, upon their return from the captivity, vexed and obstructed them in rebuilding their city and temple; Job's wife was intended by the poet to represent the idolatrous wives which many of the Jews had taken, contrary to the law, and for which they are reproved by the prophet Nehemiah, Le Clerc also supposes that the book of Job was written after the Jews were carried into

Babylon, and urges, in proof of this, the frequent Chaldaisms that occur in it.

Grotius apprehends that this book contains a true history, treated in a poetical manner; that the events recorded in it happened in Arabia, whilst the Hebrews wandered in the desert; and that the writer, who was a Hebrew, lived before the time of Ezekiel, but after David and Solomon; and that it was written for the use of the Edomites, transported to Babylon, to confirm them in the worship of the true God, and to teach them patience in adversity. Schultens ascribes the poetical, or dialogue part of this book, the style of which, he says, has all the marks of the most venerable and remote antiquity, to Job himself; the rest he supposes to be the work of some Hebrew collector. Most of the Jewish doctors believe, that Moses was the writer of this book; and M. Huet supposes that it was written by Moses in his exile in the land of Midian: nor is it improbable that it was designed to prepare the Israelites for their exodus from Egypt, and the hardships of their future peregrination.

For our own parts, we incline most to the opinion that the book was written by Moses: it was obviously written by a Hebrew, by one who had been in Arabia, and by one who wrote before the promulgation of the Mosaic law; these criterie all attach to Moses, and to no one else. Besides this we may add, that in the original the language is often peculiar, the expressions being such as are met with in the writings of Moses, and no where else.

There is a very elaborate and voluminous commentary on the book of Job, by Caryll; an ingenious version by Scott; and a valuable translation by Bishop Stock. Still, however, there is room for a new translation of this curious book with critical and theological annotations, and this we hope will soon be undertaken by a gentleman every way qualified for the task.

JOB. *s.* (A low word, of which the etymology is not known.) 1. Petty, piddling work; a piece of chance-work. 2. A low mean lucrative busy affair (*Pope*). 3. A sudden stab with a sharp instrument.

To JO'B. *v. a.* 1. To strike suddenly with a sharp instrument (*L'Estrange.*) 2. To drive in a sharp instrument (*Moxon*).

To Job. *v. n.* To play the stockjobber; to buy and sell as a broker (*Pope*).

JOB's Tears. In botany. See Coix.

JO'BBER. *s.* (from *job.*) 1. A man who sells stocks in the public funds (*Swift*). 2. One who does chancework.

JOBBERNOWL. *s.* (*jobbe*, Flemish; dull, and nowl, hnol, Saxon; a head.) Loggerhead; blockhead (*Hudibras*).

JOCASTER, in fabulous history, a daughter of Menœceus, who married Laius king of Thebes, by whom she had Œdipus. She afterwards married her son Œdipus, without knowing who he was, and had by him Eteocles, Polynices, &c. When she discovered that she had married her own son, and been guilty of incest, she hanged herself in despair. She is called Epicasta by some mythologists.

JOCKEY. *s.* (from *Jack.*) 1. A fellow that rides horses in the race (*Addison*). 2. A man that deals in horses. 3. A cheat; a trickish fellow.

To JO'CKEY. *v. a.* (from the noun.) 1. To justle by riding against one. 2. To cheat; to trick.

JOCKEY CLUB, a sporting establishment instituted and still held at Newmarket, composed of noblemen, gentlemen, and other celebrated characters attached to horse-racing; elected by ballot. This is regarded by sportsmen in general as the supreme court to which any sporting appeal can be made; and its award or decision is abided by as final, whenever solicited. All transactions within the official departments of the stewards, the keeper of the match-book, the judge, and every subordinate officer is regulated by a system of laws, of which the following are the chief:

Riders.—Every person who shall ride at Newmarket for plate, sweepstakes, or match, shall be obliged to weigh when he comes in, allowing two pounds above the weight, and no more. Every rider who shall neglect to obey this resolution, is guilty of contempt of the orders of this club, and shall be disqualified from riding hereafter at Newmarket; unless any gentleman, or his rider, shall declare, before starting, that the rider is above the weight allowed of by the aforesaid resolution.

Forfeits.—The forfeits of all bets shall be paid according to the proportion in which the principals compromise their matches.

Members of the Coffee-house.—Any person desirous of being admitted into the coffee-room, Newmarket, must be proposed by a member of the Jockey Club, and his name put over the chimney and door the day before he is to be ballotted for; there must be at least twelve members present at the ballot, and three black balls exclude.

Horses entered for two or more Prizes.—The owner of every horse, &c. entered to run for two or more prizes on the same day, shall be obliged to declare to the keeper of the match-book, before eight o'clock in the evening, preceding the day of running, which of the said prizes he intends to start his horse for; and the said keeper of the match-book shall immediately declare it in the coffee-room.

Annual Dinner.—On the day preceding the king's birth-day, three members of the club shall be appointed stewards, and commence their office on the 4th of June annually. One new steward to be appointed every year, on the 3d day of June, by the steward who quits on that day, subject to the approbation of the members of the Jockey Club then present. The senior steward to quit his office on the 3d of June annually.

The three stewards, or any two of them, shall be vested with full power to make such regulations as they think proper, in regard to the exercise ground and the course. The three stewards, concurring, shall have it in their power to appoint such person or persons, as they may choose, to keep the coffee-house, match-book, receive the stakes, collect the entrance-money,

and all other funds belonging to the Jockey Club. The stewards are to be responsible to the club for all the money collected, as belonging to it. They shall have it in their power to fix the hours of starting for each match, &c. but they shall be obliged to fix such hours of starting by eight o'clock in the evening preceding the day of running. The accounts to be produced by the stewards annually, on the 3d of June.

Watching Trials.—Any gentleman who keeps running-horses, having cause to complain of any feeder, rider, groom, boy, or other person employed by him in, or intrusted with, the knowledge of trials, or having discovered them, directly or indirectly, by betting, or wilfully in any other way (unless so allowed to do by his master), or any person, as aforesaid, living with any gentleman, being discovered in watching trials himself, or procuring other persons so to do, or by any unfair means whatsoever, endeavouring to discover trials; on such complaint being carried to any one of the stewards, such steward is to summon a general club meeting as soon as convenient; which meeting is to appoint a committee of three members, to examine into the accusation; and in case they shall be of opinion that the person or persons is or are guilty, then the person or persons so found guilty shall be dismissed from the service of the master, and shall not be employed by any member of the club in any capacity whatsoever; nor shall any horse, &c. fed or rode by him, or them, or in the management of which he or they are concerned, be suffered to start for plate, match, or subscription. And the names of the persons found guilty of these offences shall be exposed in the Racing Calendar, and inserted in a paper to be fixed up in the coffee-room at Newmarket.

Staking, shewing, and entering.—A copy of all the stakes to be made for matches, subscriptions, and sweepstakes, and the day and hour of shewing, or entering, shall be fairly written out, and fixed up, by order of the stewards, on the side of the chimney-piece, at each end of the coffee-room, on the Sunday evening before each meeting; to continue there each day of the meeting, as notice for staking, shewing, or entering; and no other shall be insisted upon.

Entry of Stakes.—A day-book shall be kept by the person appointed by the stewards, and continue in the coffee-room, in which shall be entered an account of all matches, subscriptions, and sweepstakes, to be run for each day within that meeting; and as the different stakes are made, the payments shall be marked to the names of the persons so paying.

Stakes, how to be made.—All stakes shall be made in cash, bank bills, bank post bills properly indorsed, bankers' notes payable to bearer, or bankers' notes payable to order, also properly indorsed, and not otherwise, without the consent of the party or parties present, concerned in the match, subscription, or sweepstakes, on whose account such stakes are made.

Time when.—All stakes for matches, subscriptions, and sweepstakes, shall be made before starting for the same; and in default thereof by any person, such person shall forfeit in like manner as if he had not produced his colt, filly, horse, or mare, to start; and shall have no claim to the stake or stakes of the match, subscription, or sweepstakes, should his colt, filly, horse, or mare, have started, and come first; and this to remain in full force, as an established agreement of the club; unless such person have previously obtained the consent of the party or parties present, with whom he is engaged, to dispense with his making his stake as aforesaid.

Forfeits, when to be paid.—All forfeits unpaid before starting, for any match, subscription, or sweepstakes, shall be paid to the person appointed by the stewards to received the same, at the coffee-room, before twelve o'clock at night, of the day such forfeits are determined; and each person making default therein, shall forfeit and pay to the person so appointed by the said stewards, after the rate of five pounds for every hundred pounds so forfeited; which shall be disposed of by the said stewards towards such uses as they shall think fit.

Bets made from signal.—And in order to prevent such frauds, notice shall be given, that if any person make any bet or bets, from signal or indication, after the race has been determined at the post, such person is not entitled to receive, or liable to pay the same; as such bet or bets are fraudulent, illegal, and totally void: and if any servant belonging to a member of the society shall be found to have made, or to have been engaged in the making, any such bet or bets, he shall be dismissed his service, and no farther employed by any member of the society.

Forfeits and Compromises to be entered.—All forfeits, or money paid on compromising any match or sweepstakes, shall *bona fide* be declared and entered in the day-book, in order that all bettors may be put upon an equality with the persons who had the match or sweepstakes, and may thus ascertain in what proportion they are to pay or receive.

Age of young Horses.—The stewards shall appoint some proper person to examine every colt or filly, being of the age of two, three, or four years, at the ending-post, immediately after running, the first time any colt or filly shall start for any plate, match, sweepstakes, or subscription at Newmarket; and the said appointed person is to sign a certificate of such examination, and his opinion thereupon; which certificate is to be hung up before eight o'clock in the evening of the said day of running in the coffee-room at Newmarket. But for all plates, matches, subscriptions, or sweepstakes, where the colt or filly is required to be shewn before running, the examination shall be made at the time of shewing them; and the certificate of the person appointed shall immediately, in like manner, be fixed up in the coffee-room at Newmarket.

Time of Starting and Forfeit.—The hours of starting shall be fixed up in the coffee-house by eight o'clock in the evening preceding the day of running, and it is expected that every groom shall start at the time appointed; and any groom failing so to do, shall forfeit five guineas each time to the club. It is also expected that every groom will attend to the regulations and orders to which the stewards of the club may give relative the preservation of the course and exercise ground.

Trials.—No person shall borrow or hire any horse, &c. not belonging to his avowed confederates, to run in a private trial, without entering the name of such horse, before the trial shall be run, in the book appointed to be kept for that purpose in the coffee-room at Newmarket; and no persons shall be deemed confederates who do not subscribe this article as such.

Disputes.—All disputes relative to racing at Newmarket shall be determined by the three stew-

ards, and two referees to be chosen by the parties concerned. If there should be only two stewards present, they are to fix upon a third person in lieu of the absent steward.

Winner undecided.—If for any sweepstakes, or subscription, the first two horses shall come in so near together that the judge shall not be able to decide which won, such two horses shall run for such prize over again, after the last match on the same day. The other horses which started for such sweepstakes or subscription shall be deemed losers, and entitled to their respective places, as if the race had been finally determined the first time.

Single and double Bets,—All bets determined by one event shall be subject (as before agreed) to any compromise made by the principals, and paid in proportion to such compromise; but all double bets (on account of the frequent disputes which have arisen) shall be considered as play or pay bets.

Weight, when not specified.—When any match or sweepstakes shall be made, and no particular weight specified, the horses, &c. shall carry eight stone seven pounds each. And if any weight be given, the highest weight is, by this resolution, fixed at eight stone seven pounds.

Horses engaged, when to enter.—No horse that is matched to run on the day of entrance for any plate, &c. shall be obliged to shew and enter at the hour appointed, but shall shew and enter within an hour after his engagements are over, provided such horse, &c. be named at the usual time of entrance, which is to be between the hours of eleven and one, for all plates, subscriptions, and sweepstakes, where any entrance is required, and no other particular time specified.

Bets between two Horses void.—All bets depending between any two horses, either in match or sweepstakes, are null and void if those horses become the property of one and the same person, or his avowed confederate, subsequent to the bets being made.

Challenge for the Cup.—The cup shall be challenged for on the Monday in the first spring meeting; and the horses named for it declared at six o'clock on the Saturday evening of the same meeting.

The Whip.—The whip shall be challenged for on the Monday or Tuesday in the second spring or second October meeting; and the acceptance signified, or the whip resigned, before the end of the same meeting. If challenged for, and accepted in the spring, to be run for on the Thursday in the second October meeting following; and if in the October, on the Thursday in the second spring meeting. Beacon course: weight ten stone, and to stake two hundred guineas each.

Five per Cent. saved in Forfeits.—The proprietor of any horse, &c. engaged in match or sweepstakes, who shall declare his intention of not starting before eight o'clock on the evening preceding the engagement, to the keeper of the match-book, or either of the stewards, shall be entitled to five per cent. and no more, of the forfeit.

Not staking, a Disqualification.—No person shall be allowed to start any horse, mare, or gelding, for match, sweepstakes, or subscription, unless he shall have paid all former stakes and forfeits to the keeper of the match-book by eight o'clock in the evening before starting.

Trial Ground.—The ground shall not be engaged for trials, by the proprietors of any stables of running horses, more than two days in the same week.

Crossing and Jostling.—When any match is made, in which crossing and jostling are not mentioned, they shall be understood to be barred.

Courses.—When any match or sweepstakes is made, in which no course is mentioned, it shall be understood to be the course usually run by horses of the same age as those engaged, viz. if yearlings, the Yearling Course; if two years old, the Two-years-old Course; if three years old, Rowley's Mile; if four years old, Ditchin; if five years old, or upwards, Beacon Course. And in case the horses matched should be of different ages, the course to be settled by the age of the youngest.

Forfeits.—All forfeits declared or incurred for any match, sweepstakes or subscription, shall be paid to the keeper of the match-book before twelve o'clock on the evening the race is run, under the former penalty of five per cent. to the club; and persons making default herein, shall not be allowed the deduction for the timely declaration of such profits.

Entering and shewing.—Horses, &c. entered for plates or subscriptions, shall not be required to be shewn, if such horse, &c. have before started at Newmarket; and the owner of each horse entered for a plate or subscription, shall declare to the stewards, or the keeper of the match-book, the evening before, by eight o'clock, or when the list is read, at half past nine o'clock, whether his horse be intended to run or not, which declaration shall be deemed obligatory, if in the affirmative, unless the horse be taken ill or matched; and if in the negative, his name shall be erased from the list.

Ten per Cent. saved in Forfeits,—The owners of horses, &c. engaged in matches or sweepstakes, in which the forfeits shall amount to one hundred guineas, or upwards, shall be entitled to a deduction of ten per cent. if they declare their forfeits by half an hour past nine o'clock the evening before running.

Trials.—No gentleman shall try the horse of any other person, except his declared confederate, without giving notice of such trial, by inscribing the name of such horse, or horses, or their pedigrees, with the names of their owners, before or immediately after such trials, in the book at the coffee-house.

JOCKGRIN, a town of France, in the department of Lower Rhine. Lat. 49. 13. N. Lon. 8. 16. E.

JOCO'SE. *a.* (*jocosus*, Latin.) Merry; waggish; given to jest (*Watts*).

JOCO'SELY. *ad.* Waggishly; in jest; in game (*Broome*).

JOCO'SENESS. } *s.* (from *jocose.*) Waggery; merriment (*Br.*).
JOCO'SITY. }

JO'CULAR. *a.* (*jocularis*, Latin.) Used in jest; merry; jocose; waggish (*Dryden*).

JOCULA'RITY. *s.* (from *jocular.*) Merriment; disposition to jest (*Brown*).

JOCU'ND. *a.* (*jocundus*, Latin.) Merry; gay; airy; lively (*Milton*).

JOCU'NDLY. *ad.* Merrily; gayly (*South*).

JOEL, the second of the minor prophets, flourished about 789 years B. C. His prophecy, written in a vehement style, regards

chiefly the desolation of Judea by the Chaldeans. St. Peter in the Acts applies a passage from this prophet to the establishment of christianity, and the pouring out the spirit on the day of pentecost.

To JOG. *v. a.* (*schocken*, Dutch.) To push; to shake by a sudden impulse; to give notice by a sudden push (*Norris*).

To JOG. *v. n.* 1. To move by succussation; to move with small shocks like those of a low trot (*Shakspeare*). 2. To travel idly and heavily (*Dryden*).

JOG. *s.* (from the verb.) 1. A push; a slight shake; a sudden interruption by a push or shake; a hint given by a push (*Arbuthnot*). 2. A rub; a small stop; an irregularity of motion (*Glanville*).

JO'GGER. *s.* (from *jog*.) One who moves heavily and dully (*Dryden*).

To JO'GGLE. *v. n.* To shake (*Derham*).

JOGGLING, in architecture, a method of joining stones, or timbers, so as to prevent them from sliding over each other laterally. As in fig. 1. pl. 14. where squared pieces of stone, called *joggles*, are let in half the way into each course of stones between E and F, and prevent either course from slipping horizontally. The *joggles* also put between the arch stones, as between H and L, prevent those stones from being forced either upwards or downwards.

JOGHIS, a sect of heathen religious in the East Indies, who never marry, nor hold any thing in private property; but live on alms, and practise strange severities on themselves. They are subject to a general, who sends them from one country to another to preach. They are, properly, a kind of penitent pilgrims; and are supposed to be a branch of the ancient Gymnosophists.

JOGUES, or YOOGS, certain ages, eras, or periods of extraordinary length, in the chronology of the Hindus. They are four in number:

1. The Suttee Jogue (or age of purity) is said to have lasted three million two hundred thousand years; and they hold that the life of man was extended in that age to one hundred thousand years; and that his stature was twenty-one cubits.

2. The Tirtah Jogue (in which one-third of mankind was corrupted) they suppose to have consisted of two million four hundred thousand years, and that men lived to the age of ten thousand years.

3. The Dwapaar Jogue (in which half of the human race became depraved) endured one million six hundred thousand years, and the life of man was then reduced to a thousand years.

4. The Collee Jogue (in which all mankind are corrupted, or rather lessened, for that is the true meaning of Collee) is the present era, which they suppose ordained to subsist four hundred thousand years, of which near five thousand are already past; and the life of man in that period is limited to one hundred years.

The above is the account of Mr. Halhed; from which it appears that the Chronology of the Hindoos, like that of many other Eastern nations is exceedingly wild and fabulous: it is, however, extremely probable, that the beginnings of these Jogues, are the results of retrospective calculation, as is the case with our Julian period.

JOHANNESBURG, a town of Eastern Prussia, with a citadel. Lat. 53. 16. N. Lon. 22. 39. E.

JOHANNIA. In botany a genus of the class syngenesia, order polygamia equalis. Receptacle villous; down feathery; corol floscular; calyx imbricate, radiate. One species only; a branched shrub of Peru; with small, prickly, ovate, entire, sessile, imbricate leaves; large, terminal flowers.

JOHN the Baptist (St.), the forerunner of the Messiah, was the son of Zacharias a priest, and Elizabeth. His birth was foretold by an angel. He passed his early years in retirement, and then came forth as a preacher of repentance, baptizing all who confessed their sins. Jesus himself was baptized by him in Jordan, and John bore public testimony to his being the Lamb of God that was to take away the sins of the world. This holy man was beheaded by Herod at the instigation of Herodias, his brother Philip's wife, with whom he lived in a state of adultery.

JOHN the Evangelist, was born at Bethsaida in Galilee, and was the son of Zebedee and Salome, and brother of James. Their occupation was fishing, in which they were engaged when Jesus called them to be "fishers of men." John was the beloved disciple of his master, and leaned on his breast at the last supper. After our lord was risen, Peter asked him what was to become of John, to which Jesus answered, "If I will that he tarry till I come, what is that to thee?" whence some have inferred that he was not to die, but to remain on the earth till the Messiah's second attempt; for which opinion there is no ground. After the ascension of his master he governed several churches in Asia, to which he addressed an epistle, and for whose use he drew up his gospel to counteract the opinion then getting abroad derogatory of the divinity of Christ. In the reign of Domitian he was banished to the solitary isle of Patmos, where he composed his Apocalypse, or rather recorded the visions with which he was favoured for the information of the church. It is said that before this the Roman emperor caused him to be cast into a cauldron of boiling oil, but that the apostle came out unhurt, and was then sent into exile. In the reign of Nerva, he was released and went to Ephesus, where he died under the reign of Trajan, A.D. 100, aged 94. In the sacred canon there are two other epistles by him, one to Gaius and the other to an elect lady.

JOHN (surnamed MARK), disciple and

cousin to Barnabas; son of a woman whose name was Mary, at whose house the apostles and disciples generally met. This John Mark, whom some very improperly confound with the evangelist Mark; adhered to Paul and Barnabas; but at Perga left them and returned to Jerusalem. They afterwards disagreed about taking this John with them to Asia, upon which they separated, and Barnabas took John with him to the isle of Cyprus. After this we learn nothing of John till we find him at Rome, doing signal services for Paul.

John, king of England, surnamed Lackland, was the fourth son of Henry II. and was born in 1199. He deprived his nephew Arthur of the throne to which he was heir, and confined him in prison at Rouen, where he was murdered. The States of Brittany demanded justice of Philip Augustus of France against the murderer, who was condemned to lose all his lands in that country. The pope excommunicated him, and absolved his subjects from their allegiance. He for some time resisted the papal authority, but in 1213 he found it necessary to make his submission. The English barons invited over Lewis the son of Philip, and crowned him at London in 1216, but he did not continue long in England. John died at Newark the same year, and was succeeded by his son Henry III. This prince signed the Magna Charta in 1215, being compelled so to do by the barons. He was buried at Worcester.

John, or the Gospel of St. John; a canonical book of the New Testament, containing a recital of the life, doctrine, and death of our Saviour, Jesus Christ, written by St. John, the apostle and evangelist. See Gospel.

St. John, according to Mill, Fabricius, and Le Clerc, wrote his gospel at Ephesus, after his return from the isle of Patmos, A. D. 97, at the desire of the Christians of Asia. Wetstein thought that this gospel might be writ about the year 32, after our Lord's ascension: Basnage and Lampe suppose that it was writ before the destruction of Jerusalem: Dr. Lardner adopts this opinion, and assigns the date of it to the year of Christ 68. This period brings it nearer to that of the three other gospels, which was about the year 64 or 65, and the gospel itself, the leading design of which was to shew how inexcusable the Jews were in not receiving Jesus as the Christ, and to vindicate the providence of God in the calamities already befallen, or now coming upon them, was suitable to the circumstances of the Jews at this period. The ancients assign two reasons for this undertaking: the first is, because in the other three gospels, there was wanting, the history of the beginning of Jesus Christ's preaching, until the imprisonment of John the Baptist, which therefore he applied himself particularly to relate: the second reason was, in order to remove the errors of the Corinthians, Ebionites, and other sects.

John, St. Revelations of. See Apocalypse.

John, St. one of the Philippine islands, E of Mindanao. Lat. 9. 30. N. Lon. 126. 32. E.

John, St. a city of New Brunswick, situate at the mouth of a river of the same name, in the bay of Fundy. Lat. 45. 12. N. Lon. 65. 15. W.

John, St. a town on the E. side of the island of Newfoundland. It has a good harbour, entirely landlocked, and defended by several forts. Lat. 47. 32. N. Lon. 52. 21. W.

John, St. the capital of Antigua. It is one of the most regular towns in the West Indies, and has a very commodious harbour. Lat. 17. 4. N. Lon. 62. 4. W.

John Donee. In Ichthyology. See Zeus.

JOHN'S Island, an island of the Atlantic, near the coast of South Carolina. It is about 30 miles in circuit. Lat. 32. 42. N. Lon. 80. 10. W.

JOHNSON (Samuel), one of the greatest writers of whom this country has to boast, was born at Litchfield in 1706. His father was a bookseller in that city, and had no other child except Nathanael, who died in 1737. Samuel was educated partly at the free school of Litchfield, and partly under a Mr. Wentworth at Stourbridge. In 1728 he was entered of Pembroke college, Oxford, where he remained till 1731, and was then obliged to quit the university through the poverty of his circumstances. He soon after lost his father, at whose death he found himself possessed of no more than 20l. The place of usher of the school at Bosworth was offered him, and he found it prudent to accept it, but being displeased with the behaviour of the principal he soon after relinquished the situation, and then removed to the house of a printer at Birmingham, where he translated Lobo's account of Abyssinia, for Mr. Warren, a bookseller there. In 1734 he returned to Litchfield, and published proposals for a translation of the works of Politian, with the life of that author, but the design dropped for want of encouragement. In 1735 he married a widow lady of Birmingham, named Porter, and the same year opened a school at Edial near Litchfield; but this scheme also failed, as he obtained only three scholars, one of whom was David Garrick. About this time he began his tragedy of Irene, in which he was encouraged by his great friend Mr. Walmsley of Litchfield. In 1737 he set out for the metropolis, accompanied by Garrick. On fixing his residence in London he formed a connexion with Cave, the publisher of the Gentleman's Magazine, for which miscellany he continued to write several years, his principal department being an account of the parliamentary de-

bates. At this period he contracted an intimacy with Savage, and, being alike destitute, a close friendship subsisted between them. Johnson has immortalized the name of that unfortunate wanderer by one of the most eloquent and instructive pieces of biography ever composed. In 1738 appeared anonymously his imitation of Juvenal's third Satire, under the title of London, a poem, which was commended by Pope, and well received by the public, though it rendered the author but little service in the way of profit. He made an attempt to get elected master of a free school in Leicestershire, but was disappointed, owing to his not being a master of arts. He was now forced to adopt the profession of an author for his subsistence. In 1747 he issued proposals for an edition of Shakspeare, and published the plan of his English Dictionary. The price agreed upon between him and the booksellers for the last-mentioned work was 1575l. The year following Johnson instituted a literary club in Ivy-lane, Paternoster-Row. In 1749 Garrick brought his friend's tragedy on the stage at Drury-lane, but with all his exertions the play was unsuccessful, being too stiff and laboured a composition for the stage, though admirable in the closet, This year he was imposed upon by Lauder, who pretended to have discovered proofs of Milton's being a plagiarist, but when he found that Lauder was an impostor he discarded him, In 1750 he commenced his Rambler, a periodical paper of the first class, which was continued till 1752. In this excellent work he had so little assistance that only five papers were the productions of other writers, Soon after the close of this paper he lost his wife, a circumstance which affected him sensibly, as may be seen in his Meditations, and in the sermon which he wrote on her death, with a design that Dr. Taylor should have preached it at her funeral. In 1755 appeared his dictionary, and to give it some degree of distinction the university of Oxford previously conferred on him the degree of M. A. Lord Chesterfield also endeavoured to assist it by writing two papers in its favour in the world, but, as he had neglected the work till the eve of its publication, Johnson treated his lordship with indignant contempt, The publication of this great work did not relieve him from his embarrassments, for the price of his labour had been consumed in the progress of its execution, and the year following we find him under arrest for five guineas, from which he was released by Samuel Richardson the printer. In 1758 he began his Idler, a periodical paper, which was published in a weekly newspaper. On the death of his mother in 1759 he wrote the romance of Rasselas to defray the expences of her funeral, and to pay off her debts. In 1762 his majesty settled on him a pension of 300l. per annum, without any stipulation with respect to his future literary exertions. Johnson had the honour of a conversation with the king in the library of Buckingham-house, in February, 1765, when his majesty asked if he intended to publish any more works? To this he answered, that he thought he had written enough; on which the king said, "and so should I too, if you had not written so well." About this time he instituted the Literary Club, which consisted of some of the most celebrated geniuses of the age, and still continues. In 1771 his friend Mr. Strachan endeavoured to bring him into parliament, thinking that he would have shone as a speaker, but the attempt was unsuccessful. In 1773 he took a tour with Mr. Boswell to the western islands of Scotland, of which journey he shortly after published an account. This work occasioned a difference between him and Mr. Macpherson relative to the poems of Ossian, when the latter was weak enough to threaten him with personal chastisement, which drew from Johnson a letter full of dignified spirit, In 1775 the university of Oxford sent him the degree of L.L.D. by diploma, which had before been conferred on him by the university of Dublin. In 1779 he began his lives of the English Poets, which work was not completed till 1781. Though he was now 72 years of age we perceive no decay of intellect, nor abatement of his wonted vigour. On the contrary the work is a treasure of sound criticism, and a model of literary biography. This, however, was his last performance. Nature soon began to give symptoms of failure, and to warn him of his dissolution. This was an event which he had always looked to with dread bordering upon horror. But the last days of this excellent man were sun-shine. His gloomy apprehensions vanished; he saw the ground of his confidence, and he departed in strong faith and lively hope, December 13, 1784. His remains were interred in Westminster-abbey, close by his friend Garrick; and a statue, with an appropriate inscription, has been erected to his memory in the cathedral of St. Paul. His works have been published in 12 volumes, 8vo. and his life has been written by several authors, particularly Sir John Hawkins, Mr. Murphy, Mrs. Piozzi, and Mr. Boswell, Of these we would beg to recommend the life by the latter mentioned author, as a well drawn piece of biography, at once, entertaining, interesting, and instructive: the anecdotes he relates are in general authentic and accurate; and he has corrected many mistakes of Mrs, Piozzi, and Sir John Hawkins, as a writer few have done such essential service to this country, by fixing its language and regulating its morality, as Dr, Johnson. In his person he was large, robust, and unwieldy. In his dress he was singular and slovenly. In conversation he was often violent, positive, and impatient of contra-

diction. Yet with all his singularities he had an excellent heart, full of tenderness and compassion. All his actions were the result of principle. He was a stout advocate for truth, and a zealous champion for the christian religion as professed in the church of England. In politics he was a tory, and at one period of his life a great friend to the discarded house of Stuart. He had a noble independence of mind, and could never bear to stoop to any man however exalted, or to disguise his sentiments to flatter another. His judgment was uncommonly acute and steady, his imagination quick and ready, his memory tenacious to a wonderful degree, and his conversation brilliant and instructive. His piety was solemn, fervent, and impressive, founded on the purest principles, and regulated by sound wisdom. (*Watkins*).

JOHNSON (Mrs.) the Stella of dean Swift, under which name he always mentioned her, was the daughter of Sir William Temple's steward, and the concealed, though undoubted wife of Swift. Sir William Temple bequeathed her in his will a thousand pounds, as an acknowledgment of her father's faithful services. She had an elevated understanding, with all the delicacy and softness of her sex. Her voice, though sweet in itself, was rendered still more harmonious by what she said. Her wit was poignant without severity; her manners were humane, polite, easy, and unreserved: wherever she came she attracted attention and esteem. She was strictly virtuous, sincerely religious, and constant, though not ostentatious in her devotions. She had great skill in music, and was perfectly well versed in all the arts proper to employ a lady's leisure. Her wit was a fund of perpetual cheerfulness, and her prudence kept that cheerfulness within proper bounds. In short, she exactly resembled the description Homer has given of Penelope:

A woman loveliest of the lovely kind,
In body perfect, and complete in mind.

This is the character given of Stella by those who knew her best. How long she remained in England after Sir William Temple's death, is not known; but it appears that she was married to Dr. Swift in the year 1716, by Dr. Ashe, then bishop of Clogher, though she never could prevail upon him to acknowledge her openly as his wife. The flaw which in Swift's eye reduced the value of such a jewel, was the servile state of her father; he was a man of probity, but he was only the steward of Sir William Temple. Hence Dr. Swift and Mrs. Johnson preserved the same manner of life after marriage as before it. They lived in separate houses; he remaining at the deanery, she in lodgings at a distance from him, and on the other side of the Liffey. Nothing appeared in their behaviour inconsistent with decorum, or beyond the limits of Platonic love. They conversed like friends, but industriously took care to summon witnesses of their conversation; a rule to which they adhered so strictly, that it would be difficult to prove that they had ever been together without a third person. A conduct so unnatural gave room for various comments and reflections; but however unaccountable this renunciation of the marriage rites may appear to the world, it certainly did not arise from any consciousness of too near a consanguinity between them, though the general voice of fame was willing to make them both the natural children of Sir William Temple; but this could not be true, Sir William being employed as a minister abroad from the year 1665 to 1670, so that Swift's mother, who never crossed the sea, except from England to Ireland, was out of all possibility of a personal correspondence with him, for two years before his birth. It may be imagined that a woman of Stella's delicacy must repine at such a situation. The outward honours she received are frequently bestowed on a mistress: though a wife, she was not acknowledged in that character, and though strictly virtuous, was obliged to submit to all the appearances of vice, except in the presence of those few witnesses of the cautious manner in which she lived with her husband. Hence inward anxiety disturbed by degrees the calmness of her mind, and the strength of her body. She began to decline in her health in the year 1724, and from the first symptoms of decay, rather hastened than shrunk back in the descent; tacitly pleased to find her footsteps tending to that place where they neither marry, nor are given in marriage. She died about the end of January 1727, or 1728, absolutely destroyed by the peculiarity of her fate; a fate which perhaps she could not have endured by an alliance with any other man upon earth.

JOHNSONIA, in botany. See CALLICARPA.

JOIGNY, a town of France, in the department of Yonne. Its red wines, though not of the first quality, have a great demand. Lat. 48. 0. N. Lon. 3. 36. E.

To JOIN. *v. a.* (*joindre*, French.) 1. To add one to another in contiguity (*Isaiah*). 2. To couple; to combine (*Locke*). 3. To unite in league or marriage (*Dryden*). 4. To dash together; to collide; to encounter (*Knolles*). 5. To associate (*Acts*). 6. To unite in one act (*Dryden*). 7. To unite in concord (*Corinthians*). 8. To act in concert with (*Dryden*).

To JOIN. *v. n.* 1. To grow to; to adhere; to be continuous (*Acts*). 2. To close; to clash (*Shakspeare*). 3. To unite with in marriage, or any other league (*Ezra*). 4. To become confederate (*Maccabees*).

JO'INDER. *s.* (from *join.*) Conjunction; joining; not us d (*Shakspeare*).

JO'INER. *s.* (from *join.*) One whose trade is to make utensils of wood compacted (*Moxon*).

JOINERY, the art of working in wood, or of fitting various pieces of timber together. It is called by the French menuiserie, "small work," to distinguish it from carpentry, which is employed about large and less curious works.

JOINT. *s.* (*jointure*, French.) 1. Articulation of limbs; juncture of moveable bones in animal bodies (*Temple*). 2. Hinge; junctures which admit motion of the parts (*Sidney*). 3. (In joinery.) Straight lines, in joiners' language, are called a *joint*, that is, two pieces of wood are shot or planed (*Moxon*). 4. A knot or commissure in a plant. 5. One of the limbs of an animal cut up by the butcher (*Swift*). 6. *Out of* JOINT. Luxated; slipped from the socket, or correspondent part where it naturally moves (*Herbert*). 7. *Out of* JOINT. Thrown into confusion and disorder; confused (*Shaks.*)

JOINT. Articulus. In botany, according to Linne, that part of a culm which lies between two knots. See INTERNODIUM.

JOINTS, in masonry, the separations between the stones, filled with mortar, or cement. JOINTS, in carpentry. See CARPENTRY, DOVETAIL, MORTISE, &c.

JOINT. *a.* 1. Shared among many (*Shaks.*) 2. United in the same possession (*Donne*). 3. Combined; acting together in consort (*Addison*).

To JOINT. *v. a.* (from the noun.) 1. To form in articulations (*Ray*). 2. To form many parts into one (*Dryden*). 3. To join together in confederacy (*Shaks.*) 4. To divide a joint; to cut or quarter into joints (*Dryden*).

JO'INTED. *a.* (from *joint.*) Full of joints, knots, or commissures (*Philips*).

JOINTED. In botany articulatus. Applied to the root, in Lathræa, Oxalis, Martynia, Dentaria—to the stem or culm, in corn and crasses—to the leaves, when one leaflet grows from the top of another, to the spike, peduncle, petiole, capsule, silique and legume.

JO'INTER. *s.* (from *joint.*) A sort of plane (*Moxon*).

JO'INTLY. *ad.* (from *joint.*) 1. Together; not separately (*Hooker*). 2. In a state of union or co-operation (*Dryden*).

JO'INTRESS *s.* (from *jointure.*) One who holds any thing in jointure (*Shakspeare*).

JO'INTSTOOL. *s.* (*joint* and *stool.*) A stool made not merely by insertion of the feet, but by inserting one part in another (*Arbuthnot*).

JO'INTURE. *s.* (*jointure*, French.) Estate settled on a wife at marriage to be enjoyed after her husband's decease (*Pope*).

JOINVILLE, an ancient town in France, in the department of Upper Marne. Lat. 48. 20. N. Lon. 5. 20. E.

JOISTS, in carpentry, pieces of timber framed into the girders and summers, on which the boards of the floor are laid. They are of various kinds; as 1. *Common joists*, those which are framed level or *flush* with the upper surface of the girders, but are seldom of equal depth. 2. *Trimming joists*, those which are framed into two other joists, that other joists may be framed into them, where the opening is made for a staircase, or a chimney. 3. *Binding joists*, those which are laid across from girder to girder, and about three or four inches lower than their upper surface, in order that other joists, called 4. *Bridging joists*, may be laid over them parallel to the girders. 5. *Ceiling joists*, are tenoned into the binding of joists, and are generally made slender, having but little weight to support. The best relative dimensions of common joists of fir timber, are contained in the following table.

Length.	Breadth.	Height.
6 *f*.	2 *i*	8 *i*
8·	2·5	8·2
9	3·	8·
10	3·	8·4
11	3·5	8·1
12	4·	8

To JOIST, *v. a.* (from the noun.) To fit in the smaller beams of a flooring.

JOKE. *s.* (*jocus*, Latin.) A jest; something not serious (*Watts*).

To JOKE *v. n.* (*jocor*, Latin.) To jest; to be merry in words and actions (*Gay*).

JO'KER. *s.* (from *joke.*) A jester; a merry fellow (*Dennis*).

IOLAIA, a festival at Thebes, the same as that called Heracleia. It was instituted in honour of Hercules and his friend Iolas, who assisted him in conquering the Hydra. It continued during several days, on the first of which were offered solemn sacrifices. The next day horse-races and athletic exercises were exhibited. The following day was set apart for wrestling; the victors were crowned with garlands of myrtle generally used at funeral solemnities. They were sometimes rewarded with tripods, of brass.

IOLAS or IOLAUS, in fabulous history, a son of Iphiclus king of Thessaly, who assisted Hercules in conquering the Hydra, and burnt with a hot iron the place where the heads had been cut off, to prevent the growth of others. He was restored to his youth and vigour by Hebe, at the request of his friend Hercules. Some time afterwards Iolas assisted the HERACLIDÆ against Eurystheus, and killed the tyrant with his own hand. According to Plutarch, Iolas had a monument in Bœotia and Phocis, where lovers used to go and bind themselves by the most solemn oaths of fidelity, considering the place as sacred to love and friendship. According

to Diodorus and Pausanias, Iolas died and was buried in Sardinia.

JOLE. *s.* (*gueule*, French; ceol, Saxon.) 1. The face or cheek (*Collier*). 2. The head of a fish (*Pope*).

To JOLL. *v. a.* (from *joll*, the head.) To beat the head against any thing; to clash with violence (*Shakspeare. L'Estrange*).

JO'LLILY. *ad.* (from *jolly.*) In a disposition to noisy mirth (*Dryden*).

JO'LLIMENT. *s.* (from *jolly.*) Mirth; merriment; gayety; obsolete (*Spenser*).

JO'LLINESS. } *s.* (from *jolly.*) 1. Gayety;
JO'LLITY. } elevation of spirit (*Sidney*).
2. Merriment; festivity (*Addison*).

JO'LLY. *a.* (*joli*, Fr.) 1. Gay; merry; airy; cheerful (*Prior*). 2. Plump; like one in high health (*South*).

To JOLT. *v. n.* To shake as a carriage on rough ground (*Swift*).

To JOLT. *v. a.* To shake one as a carriage does.

JOLT. *s.* Shock; violent agitation (*Swift*).

JO'LTHEAD. *s.* A great head; a dolt; a blockhead (*Grew*).

ION, in fabulous history, a son of Xuthus and Creusa, daughter of Erectheus, who married Helice, the daughter of Selinus king of Ægiale. He succeeded to the throne of his father in-law; and built a city, which he called Helice, on account of his wife. His subjects from him received the name of Ionians, and the country that of Iouia. See Ionia.

Ion, a tragic poet of Chios, who flourished about the 82d Olympiad. His tragedies were represented at Athens, where they met with universal applause. He is mentioned and greatly recommended by Aristophanes and Athenæus, &c.

IONA. See Icolmkill.

JONAH, or *Prophecy of* Jonah, a canonical book of the Old Testament; in which it is related, that Jonah (about 771 B. C.) was ordered to go and prophesy the destruction of the Ninevites, on account of their wickedness. But the prophet, instead of obeying the divine command, embarked for Tarshish; when, a tempest arising the mariners threw him into the sea: he was swallowed by a great fish; and, after being three days and nights in his belly, was cast upon the land. Hereupon being sensible of his past danger and surprising deliverance, he betook himself to the journey and embassy to which he was appointed; and arriving at Nineveh, the metropolis of Assyria, he, according to his commission, boldly laid open their sins and miscarriages, and proclaimed their sudden overthrow: upon which the whole city, by prayer and fasting, and a speedy repentance, happily averted the divine vengeance, and escaped the threatened ruin. Jonah upon this, fearing to pass for a false prophet, retired to a hill at some distance from the city; where God, by a miracle, condescended to show him the unreasonableness of his discontent.

Jonas (Arnagrimus), a learned Icelander, acquired great reputation by his skill in the sciences, and particularly in astronomy. He was the coadjutor to Gundebran de Thorlac, bishop of Hola, in Iceland. He refused that bishopric, after the death of Gundebran; and died 1649. He wrote several works; the principal of which are, *Idea vera Majistratûs*, and his history and description of Iceland.

JONEQUETIA. In botany a genus of the class decandria, order pentagynia. Calyx five-leaved; petals five; capsule five-grained, one-celled, five-valved, five-seeded; seeds coated. One species only: a Guiana tree with unevenly pinate leaves; oblong, pointed, entire veined, glabrous leaflets; terminal, panicled flowers.

JONES (Inigo), a famous architect, was born in London about 1572. He was bred a joiner, but his skill in drawing recommended him to the notice of the earl of Pembroke: he sent him to Italy, where he acquired a complete knowledge of architecture. James I. made him surveyor general of his works, which office he discharged with great fidelity. He continued in the same post under Charles I. and had the same superintendence of the building of St. Paul's Cathedral; and the management of the masques and interludes for the entertainment of the court. This brought him into a squabble with Ben Jonson his coadjutor, who ridiculed him in his comedy of Bartholomew-fair under the name of Lantern Leatherhead. He suffered considerably during the time of Cromwell. Grief, misfortunes, and age, brought him to his grave in July 1651. In 1655 appeared his Discourse on Stonehenge, in which he attempts to prove it a Roman temple. As an architect Inigo generally, but not always, shines to great advantage. He designed the palace of Whitehall and the Banquetting-house, the church and piazza of Covent-garden, Coleshill in Berkshire, Cobham-hall in Kent, and various other buildings public and private. The principle of his designs were published in folio, in 1727, and some in 1744.

JONES (William), an eminent mathematician, was born in the isle of Anglesea, in 1675. He settled in London as a schoolmaster, and had the honour of instructing lord Macclesfield's son in the mathematics, which procured him the place of secretary to that nobleman, and the post of deputy-teller of the exchequer. He lived on terms of the greatest intimacy with sir Isaac Newton, and other great mathematicians; and was chosen a fellow of the Royal Society. He died in affluent circumstances in 1749. He published, 1. A compendium of the Art of Navigation, 8vo. 1702; 2. Synopsis Palmariorum Matheseos, or a new Introduction to the Mathematics, 8vo. 1706; 3. Several papers in the Phil. Trans. 4. An elegant analysis of several of Newton's papers, entitled Analysis per quantitatem Series, Flux-

iones, ac Differentias; cum Enumeratione Linearum Tirtii Ordinis.

In all these works of Mr. Jones, a remarkable neatness, brevity, and accuracy, every where prevails. He seemed to delight in a very short and comprehensive mode of expression and arrangement; insomuch that sometimes what he has contrived to express in two or three pages, would occupy a little volume in the ordinary style of writing.

JONES (Sir William), a celebrated English writer, and judge in India, was the son of the preceding, and born in September 1746. He received his education at Harrow school, from whence he removed to University college, Oxford, and about 1769 made the tour of France. The year following he translated the history of Nadir Shah, from a Persian MS. into French at the request of the king of Denmark, but received no other return than the honour of being chosen a member of the royal society of Copenhagen. The year following he published his grammar of the Persian language, and also Dissertation sur la Litterature Orientale, 8vo. which was followed by Lettre a Mons. A—— du P——, dans laquelle est compris l'Examin de sa Traduction des Libres attribues à Zoroasire, in which he vindicated the university of Oxford from the attack of an arrogant Frenchman. In 1773, having taken his degree of M.A. he resolved on making the law his profession, and accordingly applied to that study with great assiduity. Soon after his being called to the bar, he was appointed commissioner of bankrupts, but did not obtain much practice in the courts. In 1779 he published The speeches of Isæus, in causes concerning the law of succession to property at Athens, with a prefatory discourse, &c. 4to. The shameful riots in London in 1780 occasioned him to write a piece, entitled, An Inquiry into the Legal Mode of suppressing Riots; with a Constitutional Plan of future Defence. Next year he printed an essay on the Law of Bailments, 8vo. a treatise which did great honour to his legal abilities. About this time we find him engaged in politics, and a zealous member of the constitutional society. In 1783 he was appointed judge of the supreme court of Bengal, on which occasion he received the honour of knighthood. During his voyage to the East Indies he planned the scheme of a society which was afterwards established at Calcutta, and of which sir William became the active president. Several volumes of their transactions have been published, and the Asiatic Society promise immense benefits to the world of science and literature. Sir William's conduct as a judge was most exemplary, and his literary exertions continued indefatigable. He died in India in 1794. His works were collected and published in 6 vols. 4to. 1799, by his widow, the daughter of the late Dr. Shipley, bishop of St. Asaph. "It is to the shame of scepticism (as one of his biographers well observes), to the encouragement of hope, and to the honour of genius, that this great man was a sincere believer in the doctrines of Christianity, and that he was found dead in his closet in the attitude of addressing his prayer to God." We shall give his character as it was drawn by Sir John Shore, baronet (now lord Teignmouth) in a discourse delivered at a meeting of the Asiatic Society, held on the 22d of May 1794.

"His capacity for the acquisition of languages has never been excelled. In Greek and Roman literature, his early proficiency was the subject of admiration and applause; and knowledge of whatever nature, once obtained by him, was ever afterwards progressive. The more elegant dialects of modern Europe, the French, the Spanish, and Italian, he spoke and wrote with the greatest fluency and precision; and the German and Portuguese were familiar to him. At an early period of life his application to Oriental literature commenced; he studied the Hebrew with ease and success; and many of the most learned Asiatics have the candour to avow, that his knowledge of Arabic and Persian was as accurate and extensive as their own; he was also conversant in the Turkish idiom, and the Chinese had even attracted his notice so far as to induce him to learn the radical characters of that language, with a view perhaps to farther improvements. It was to be expected, after his arrival in India, that he would eagerly embrace the opportunity of making himself master of the Sanscrit; and the most enlightened professors of the doctrines of Brahma confess with pride, delight, and surprize, that his knowledge of their sacred dialect was most critically correct and profound. The Pandits who were in the habit of attending him, could not after his death, suppress their tears for his loss, nor find terms to express their admiration at the wonderful progress he had made in their sciences.

"Before the expiration of his twenty-second year, he had completed his Commentaries on the Poetry of the Asiatics, although a considerable time afterwards elapsed before their publication; and this work, if no other monument of his labours existed, would at once furnish proofs of his consummate skill in the Oriental dialects, of his proficiency in those of Rome and Greece, of taste and erudition far beyond his years, and of talents and application without example.

"But the judgment of Sir William Jones was too discerning to consider language in any other light than as the key of science, and he would have despised the reputation of a mere linguist. Knowledge and truth were the objects of all his studies, and his ambition was to be useful to mankind; with these views he extended his researches to all languages, nations, and times.

"Such were the motives that induced him

to propose to the government of India, what he justly denominated a work of national utility and importance, the compilation of a copious Digest of Hindu and Mahomedan Law, from Sanscrit and Arabic originals, with an offer of his services to superintend the compilation, and with a promise to translate it. He had foreseen, previous to his departure from Europe, that without the aid of such a work, the wise and benevolent intentions of the legislature of Great Britain, in leaving to a certain extent the natives of these provinces in possession of their own laws, could not be completely fulfilled; and his experience, after a short residence in India, confirmed what his sagacity had anticipated, that without principles to refer to, in a language familiar to the judges of the courts, adjudications amongst the natives must too often be subject to an uncertain and erroneous exposition, or wilful misinterpretation of their laws.

"To the superintendance of this work, which was immediately undertaken at his suggestion, he assiduously devoted those hours which he could spare from his professional duties. After tracing the plan of the Digest, he prescribed its arrangement and mode of execution, and selected from the most learned Hindus and Mahomedans fit persons for the task of compiling it: flattered by his attention, and encouraged by his applause, the Pendits prosecuted their labours with cheerful zeal to a satisfactory conclusion. The Molavees have also nearly finished their portion of the work; but we must ever regret, that the promised translation, as well as the meditated preliminary dissertation, have been frustrated by that decree, which so often intercepts the performance of human purposes.

"During the course of this compilation, and as auxiliary to it, he was led to study the works of Menu, reputed by the Hindus to be the oldest and holiest of legislators; and finding them to comprise a system of religious and civil duties, and of law in all its branches, so comprehensive and minutely exact, that it might be considered as the Institutes of Hindu Law, he presented a translation of them to the government of Bengal. During the same period, deeming no labour excessive or superfluous that tended in any respect to promote the welfare or happiness of mankind, he gave the public an English version of the Arabic Text of the Sirajiah or Mahomedan Law of Inheritance, with a Commentary. He had already (as has been observed) published in England a translation of a tract on the same subject by another Mahomedan lawyer, containing, as his own words express, 'a lively and elegant Epitome of the Law of Inheritance of Zaid.'

"Besides these learned and important works, he had laid a plan (as appeared from a paper found after his death, entitled *Desiderata*) for investigating the history and other interesting subjects relating to India, Arabia, Persia, China, Tartary, and the eastern world in general. We have already enumerated attainments and works which from their diversity and extent, seem far beyond the capacity of the most enlarged minds; but the catalogue may yet be augmented. To a proficiency in the languages of Greece, Rome, and Asia, he added the knowledge of the philosophy of those countries, and of every thing curious and valuable that had been taught in them. The doctrines of the Academy, the Lyceum, or the Portico, were not more familiar to him than the tenets of the Vedas, the mysticism of the Susis, or the religion of the ancient Persians; and whilst, with a kindred genius, he pursued with rapture the heroic, lyric, or moral compositions of the most renowned poets of Greece, Rome, and Asia, he could turn with equal delight and knowledge to the sublime speculations or mathematical calculations of Barrow and Newton. With them also he professed his conviction of the truth of the Christian religion; and he justly deemed it no inconsiderable advantage, that his researches had corroborated the multiplied evidence of Revelation, by confirming the Mosaic account of the primitive world."

There were, in truth, few sciences in which he had not acquired considerable proficiency; in most, his knowledge was profound. The theory of music was familiar to him; nor had he neglected to make himself acquainted with the interesting discoveries lately made in chemistry; "and I have heard him (says Lord Teignmouth) assert, that his admiration of the structure of the human frame had induced him to attend for a season to a course of anatomical lectures, delivered by his friend, the celebrated Hunter."

His last and favourite pursuit was the study of botany, which he originally began under the confinement of a severe and lingering disorder, which with most minds would have proved a disqualification from any application. It constituted the principal amusement of his leisure hours.

Lord Teignmouth, addressing himself to the Asiatic Society, says, "Of the private and social virtues of our lamented president, our hearts are the best records. To you who knew him, it cannot be necessary for me to expatiate on the independence of his integrity, his humanity, probity, or benevolence, which every living creature participated; on the affability of his conversation and manners, or his modest, unassuming deportment: nor need I remark, that he was totally free from pedantry, as well as from arrogance and self-sufficiency, which sometimes accompany and disgrace the greatest abilities. His presence was the delight of every society, which his conversation exhilarated and improved; and the public have not only to lament the loss of his talents and abilities, but that of his example."

The singular abilities, worth, and excel-

lence of this great man, will, we trust, be an ample apology for our dwelling thus long and minutely upon his character and attainments.

IONE'SIA. In botany a genus of the class heptandria, order monogynia. Calyx two-leaved; corol funnel-form, with a fleshy, closed tube, and four-cleft border; nectary a ring inserted in the throat of the tube of the corol, and bearing the stamens; germ pedicelled; legume similar-shaped; from four to eight-seeded. One species only: an East Indian tree with alternate, unequally pinate leaves; leaflets four or six pair, oblong-lanceolate; orange flowers in axillary and terminal cymes.

IONIA, a country of Asia Minor, bounded on the N. by Æolia, on the W. by the Ægean and Icarian seas, on the south by Caria, and on the east by Lydia and part of Caria. It was founded by colonies from Greece, and particularly Attica, by the Ionians or subjects of Ion. Ionia was divided into 12 small states, which formed a celebrated confederacy, often mentioned by the ancients. These 12 states were Priene, Miletus, Colophon, Clazomenæ, Ephesus, Lebedos, Teos, Phocæa, Erythræ, Smyrna, and the capitals of Samos and Chios. The inhabitants of Ionia built a temple which they called Pan Ionium, from the concourse of people that flocked there from every part of Ionia. After they had enjoyed for some time their freedom and independence, they were made a tributary to the power of Lydia by Crœsus.

IONIAN MODE, in music. See MODE.

IONIC ORDER. See ARCHITECTURE.

IONIC *Dialect*, in grammar, a manner of speaking peculiar to the people of Ionia.

IONIC *Sect* was the first of the ancient sects of philosophers; the others were the Italic and Eleatic. The founder of this sect was Thales, who, being a native of Miletus in Ionia, occasioned his followers to assume the appellation of Ionic: Thales was succeeded by Anaximander, and he by Anaximenes, both of Miletus; Anaxagoras Clazomenius succeeded them, and removed his school from Asia to Athens, where Socrates was his scholar. It was the distinguishing tenet of this sect, that water was the principle of all natural things.

IONIUM MARE, a part of the Mediterranean sea, at the bottom of the Adriatic. It lies between Sicily and Greece. It is said to have received its name from Io, who swam across it, after she had heen metamorphosed into a heifer.

JONKIOPING, a town of Sweden, in the province of Smaland, situated near the Wetter Lake, containing two fauxbourgs, three churches, an arsenal, and a manufacture of arms, and about 3000 inhabitants. It is the seat of justice for Gothland: 156 miles SW. Stockholm. Lat. 57. 12. N. Lon. 14. 46. E.

JONQUIL, in botany. See NARCISSUS.

JONSON (Benjamin), an English poet, was born in Westminster in 1574. His father was a clergyman, and died about a month before the birth of our poet, who received his education at Westminster school, but his mother marrying a bricklayer, compelled him to work at the same business. This proving very disagreeable to him, he entered for a soldier, and went to the Netherlands, where he distinguished himself by his valour. On his return home he went to St. John's college, Cambridge, but did not remain there long, owing to his extreme poverty. He then turned his attention to the stage, and became both player and dramatic writer, but his success in both capacities was alike indifferent till Shakspeare gave him his assistance. His first printed play was the comedy, entitled, Every Man in his Humour, after which he produced a new piece annually for several years. He engaged with Chapman and Marston in writing a comedy called, Eastward Hoe, which being construed into a satire on the Scotch nation, had like to have brought the authors into the star chamber and the pillory. At the accession of James I. Jonson had the honour of preparing the device for the entertainment of the king, on his passage from the Tower to Wesminster-abbey. He continued to have the management of all the masques and public shews during that reign, and also in that of Charles I. In 1619 he was honoured with the degree of M.A. by the university of Oxford, and in 1621 he was appointed poet-laureat on the death of Samuel Daniel. The salary was then but 100 marks per annum, but in 1630 Jonson, by a petition, got it raised to 100l. Notwithstanding this allowance, and the profits of his performances he continued poor, and sometimes was in very distressed circumstances, from which he was often relieved by the bounty of the king. He died in 1637, and was buried in Westminster-abbey: on his grave-stone is the following inscription:

O! Rare Ben Jonson!

His works, consisting of plays, poems, and some pieces in prose, were published in 1756, in 7 vols. 8vo. under the care of Mr. Whalley.

JONTHUS. (from ιον the violet and ανθος a flower.) In medicine a hard pimple in the face, of a violet colour, frequent about the age of puberty.

JOPÆAN, among the ancients, an exclamation used on account of a victory, or some prosperous event.

JOPPA, a sea-port town in Palestine, lying south of Cæsarea; and anciently the only port to Jerusalem, whence all the materials sent from Tyre towards the building of Solomon's temple were brought hither and landed (2 Chr. ii. 16.) It is said to have been built by Japhet, and from him to have taken its name Japho, afterwards moulded into Joppa; and the very heathen geographers speak of it as built before the flood. It is

now called Jaffa, somewhat nearer to its first appellation.

JORDAN, a river of Palestine, which rises in Mount Libanus, and runs from N. to S. forming two lakes, the one formerly called the Sea of Galilee, or lake of Tiberias, and the other, the Dead Sea.

JORDANO (Luca), a famous Italian painter, was born at Naples in 1632, and learnt the rudiments of his art from his father, after which he went to Rome, where he studied the manner of Pietro da Cortona, but applied himself chiefly to the works of Paul Veronese. In 1692 the king of Spain employed him to paint the Escurial. He here executed several great works, and then returned to Naples. He painted with great facility, and acquired considerable wealth. He died in 1705.

JO'RDEN. *s.* (ȝoр, *stercus*, and ден, *receptaculum.*) A pot (*Pope*).

JORTIN (John), a very learned and ingenious English clergyman, was born in Huntingdonshire about the year 1701. Having some private fortune of his own, and being of a peculiar disposition that could not solicit promotion, he remained long without preferment. In 1738, lord Winchester gave him the living of Eastwell in Kent; but the place not agreeing with his health, he soon resigned it. Archbishop Herring, who had a great value for him, about the year 1751 presented him to the living of St. Dunstan's in the East; and bishop Osbaldiston in 1762 gave him that of Kensington, with a prebend in St. Paul's cathedral, and made him archdeacon of London. His temper, as well as his aspect, was rather morose and saturnine; but in company that he liked, he was at all times facetious, yet still with a mixture of sal censura superiorum. His sermons were sensible and argumentative; and would have made more impression on his hearers, had he been more attentive to the advantages flowing from a good delivery; but he appeared to greater advantage as a writer. His remarks on ecclesiastical history, his six dissertations, his life of Erasmus, and his sermons, were extremely well received by the public, and have undergone several editions. He died in the year 1770.

JOSEPH, the son of Jacob and Rachel, was the favourite of his father, on which account his brethren hated him, and sold him to some Midianites, who carried him into Egypt, where he was disposed of to Potiphar, a lord of the court. His master placed an implicit confidence in him, and his mistress having conceived a passion for him, tempted him to commit adultery, which he resisted. Enraged at this treatment, she charged him with having endeavoured to violate her chastity, in consequence of which he was thrown into prison, but was delivered from thence owing to his skill in explaining a mysterious dream of Pharaoh. The king then made him prime-minister, and by his wisdom he not only supplied Egypt with corn in a time of famine, but sold that commodity to the people of other countries. Among those who came thither to purchase corn were his brethren, to whom, after some interesting scenes, Joseph discovered himself, and then sent for his father and all his relations to come to Egypt, where he assigned them the province of Goshen for their residence. Joseph married a daughter of the priest of On, by whom he had two sons, Ephraim and Manasseh, who became the heads of two tribes. He died B. C. 1635, after governing Egypt 80 years.

JOSEPHUS, the celebrated historian of the Jews, was of noble birth; by his father Mattathias, descended from the high-priests, and by his mother of the blood-royal of the Maccabees: he was born A. D. 37, under Caligula, and lived under Domitian. At 16 years of age, he betook himself to the sect of the Essenes, and then to the Pharisees; and having been successful in a journey to Rome, upon his return to Judæa he was made captain-general of the Gallilæans. Being taken prisoner by Vespasian, he foretold his coming to the empire, and his own deliverance by his means. He accompanied Titus at the siege of Jerusalem, and wrote his "Wars of the Jews," which Titus ordered to be put in the public library. He afterwards lived at Rome, where he enjoyed the privileges of a Roman citizen, and where the emperors loaded him with favours, and granted him large pensions. Besides the above work, he wrote, 1. Twenty books of Jewish antiquities, which he finished under Domitian. 2. Two books against Apion. 3. An elegant discourse on the martyrdom of the Maccabees. 4. His own life. These works are excellently written in Greek.

JOSHUA, a canonical book of the Old Testament, containing a history of the wars and transactions of the person whose name it bears. This book may be divided into three parts; the first of which is a history of the conquest of the land of Canaan; the second, which begins at the twelfth chapter, is a description of that country, and the division of it among the tribes; and the third, comprised in the two last chapters, contains the renewal of the covenant he caused the Israelites to make, and the death of their victorious leader and governor. The whole comprehends a term of 17, or, according to others, of 27 years.

To JO'STLE. *v. a.* (*jouster*, French.) To justle; to rush against.

JOT. *s.* (ἰῶτα.) A point; a tittle; the least quantity assignable. (*Shak.*)

JO'VIAL. *a.* (*jovial*, Fr.) 1. Under the influence of Jupiter (*Brown*). 2. Gay; airy; merry (*Bacon*).

JO'VIALLY. *ad.* Merrily; gayly.

JO'VIALNESS. *s.* (from *jovial.*) Gayety; merriment.

JOVIANUS (Flavius Claudius), a Roman emperor, was born in Pannonia, of a noble family, in 331. He was elected emperor by the Roman soldiers after the death of Julian, but refused the dignity because they were pagans, on which they assured him that they were christians, and he accepted the crown. He made a disadvantageous peace with Persia, and shut up the heathen temples, and recalled the banished clergy. He died after reigning seven months, owing to the suffocating vapour of burning charcoal which had been placed in his room, A. D. 364.

JOVIUS (Paul), an eminent historian, was born at Como in Italy, in 1483, and having received an excellent education, went to Rome, where he wrote his first piece, De Piscibus Romanis, which he dedicated to cardinal Lewis of Bourbon. He received a pension from Francis I. king of France, who gave him many other marks of his esteem. Jovius was a most importunate beggar, and in his solicitations never indulged much modesty. Clement VII. gave him the bishopric of Nocera, which dignity he by no means adorned in his course of life, being much given to women. He died in 1552, and was interred at Florence. His greatest work is a history of his own time, in folio, 3 vols. Strasburgh, 1556. It is written in an admirable style, but must be read with caution. There was another bishop of the same name in that age, who was a man of letters and a poet.

JO'UISANCE. *s.* (*rejouissance*, Fr.) Jollity; merriment; festivity: obsolete. (*Spens.*)

JO'URNAL. *a.* (*journale*, Fr.) Daily; quotidian: out of use. (*Shak.*)

Jo'urnal. *s.* (*journal*, French.) 1. A diary; an account kept of daily transactions (*Arbuthnot*). 2. Any paper published daily.

Jo'urnal, a day-book, register, or account of what passes daily. See Diary. In merchants' accounts, it denotes a book into which every particular article is posted out of the waste-book, and made debtor.

Jo'urnal, in maritime affairs, is a register kept by the pilot, and others, noticing every thing that happens to the ship, from day to day, and from hour to hour, with regard to the winds, the rhumbs or courses, the knots or rate of running, the rake, soundings, astronomical observations, for the latitudes and longitudes, &c.; to enable them to adjust the reckoning, and determine the place where the ship is.

Jo'urnal is also used for the title of several books which come out at stated times; and give accounts and abstracts of the new books that are published, with the new improvements daily made in arts and sciences.

The first journal of this kind was, the Journal des Scavans, printed at Paris: the design was set on foot for the ease of such as are too busy, or too lazy, to read the entire books themselves. It seems an excellent way of satisfying a man's curiosity, and becoming learned upon easy terms: and so useful has it been found, that it has been executed in most other countries, though under a great variety of titles.

Of this kind are the Acta Eruditorum of Leipsic; the Nouvelles de la Republique des lettres of Mr. Bayle, &c.; the Bibliotheque Universelle, Choisie, et Ancienne et Moderne, of M. le Clerc; the Memoirs de Trevoux, &c. In 1692, Juncker printed in Latin, An Historical Treatise of the Journals of the Learned, published in the several parts of Europe; and Wolfius, Struvius, Morhoff, Fabricius, &c. have done something of the same kind.

The Philosophical Transactions of London; the Memoirs of the Royal Academy of Sciences; those of the Academy of Belles Lettres; the Miscellanea Naturæ Curiosorum; the Experiments of the Academy del Cimento, the Acta Philo-exoticorum Naturæ et Artis, which appeared from March 1686 to April 1687, and which are a history of the Academy of Bresse; the Miscellanea Berolinensia, or Memoirs of the Academy of Berlin; the Commentaries of the Academy of Petersburgh; the Memoirs of the Institute at Bologna; the Acta Literaria Sueciæ; the Memoirs of the Royal Academy of Stockholm, begun in 1740; the Commentarii Societatis Regiæ Gottingensis, begun in 1750, &c. &c. are not so properly Journals, though they are frequently ranked in the number.

Juncker and Wolfius give the honour of the first invention of Journals to Photius. His Bibliotheca, however, is not altogether of the same nature with the modern Journals, nor was his design the same. It consists of abridgments, and extracts of books which he had read during his embassy in Persia. M. Salo first began the Journal des Sçavans at Paris, in 1665, under the name of the Sieur de Hedonville; but his death soon after interrupted the work. The abbé Gallois then took it up, and he, in the year 1674, gave way to the abbé de la Roque, who continued it nine years, and was succeeded by M. Cousin, who carried it on till the year 1702, when the abbé Bignon instituted a new society, and committed the care of continuing the Journal to them, who improved and published it under a new form. This society is still continued, and M. de Loyer has had the inspection of the Journal, which is no longer the work of any single author, but of a great number.

The other French Journals are the Memoirs and Conferences of Arts and Sciences, by M. Dennis, during the years 1672, 1673, and 1674; New Discoveries in all the parts of Physic, by M. de Blegny; the Journal of Physic, begun in 1684, and some others, discontinued almost as soon as begun.

Rozier's Journal de Physique, begun in July 1771, and continued, till in the year 1780, there were 19 vols. quarto.

The Nouvelles de la Republique des

Lettres, News from the Republic of Letters, were begun by M. Bayle in 1684, and carried on by him till the year 1687, when M. Bayle being disabled by sickness, his friends, M. Bernard and M. de la Roque, took them up, and continued them till 1699. After an interruption of nine years, M. Bernard resumed the work, and continued it till the year 1710. The History of the Works of the Learned, by M. Basnage, was begun in the year 1686, and ended in 1710. The Universal Historical Library, by M. le Clerc, was continued to the year 1693, and contained 25 volumes. The Bibliotheque Choisie of the same author, began in 1703. The Mercury of France is one of the most ancient Journals of that country, and is continued by different hands: the Memoirs of a History of Sciences and Arts, usually called Memoires des Trevoux, from the place where they are printed, began in 1701. The Essays of Literature reached but to a twelfth volume in 1702, 1703, and 1704; these only take notice of ancient authors. The Journal Literaire, by Father Hugo, began and ended in 1705. At Hamburgh they have made two attempts for a French Journal, but the design failed: an Ephemerides Sçavantes has also been undertaken, but that soon disappeared. A Journal des Sçavans, by M. Dartis, appeared in 1694, and was dropt the year following. That of M. Chauvin, begun at Berlin in 1696, held out three years; and an essay of the same kind was made at Geneva. To these may be added, the Journal Literaire, begun at the Hague 1715, and that of Verdun, and the Memoires Literaires de la Grande Bretagne by M. de la Roche; the Bibliotheque Angloise, and Journal Britannique, which are confined to English books alone. The Italian Journals are, that of abbot Nazari, which lasted from 1668 to 1681, and was printed at Rome. That of Venice began in 1671, and ended at the same time with the other: the authors were Peter Moretti, and Francis Miletti. The Journal of Parma, by Roberti and Father Bacchini, was dropped in 1690, and resumed again in 1692. The Journal of Ferrara, by the abbé de la Torre, began and ended in 1691. La Galerio di Minerva, begun in 1696, is the work of a society of men of letters. Seignior Apostolo Zeno, secretary to that society, began another Journal in 1710, under the protection of the grand duke: it is printed at Venice, and several persons of distinction have a hand in it.

The Fasti Euriditi della Bibliotheca Volante, were published at Parma. There has appeared since, in Italy, the Giornale dei Letterati.

The principal among the Latin Journals, is that of Leipsic, under the title of Acta Eruditorum, begun in 1682: P. P. Manzani began another at Parma. The Nova Literaria Maris Balthici, lasted from 1698 to 1708. The Nova Literaria Germaniæ, collected at Hamburgh, began in 1703. The Acta Literaria ex Manuscriptîs, and the Bibliotheca curiosa, begun in 1705, and ended in 1707, are the works of Struvius. Messrs. Kuster and Sike, in 1697, began a Bibliotheca Novorum Librorum, and continued it for two years. Since that time, there have been many Latin Journals; such, besides others, is the Commentarii de Rebus in Scientia Naturali et Medicina gestis, by M. Ludwig. The Swiss Journal, called Nova Literaria Helvetiæ, was begun in 1702, by M. Scheuchzer; and the Acta Medica Hafnensia, published by T. Bartholin, make five volumes from the year 1671 to 1679. There are two Low Dutch Journals; the one under the title of Bookzal van Europe; it was begun at Rotterdam in 1692, by Peter Rabbus; and continued from 1702 to 1708, by Sewel and Gavern: the other was done by a physician, called Ruiter, who began it in 1710. The German Journals of best note are, the Monathlichen Unterredungen, which continued from 1689 to 1698. The Bibliotheca Curiosa, begun in 1704, and ended in 1707, both by M. Tenzel. The Magazin d'Hambourg, begun in 1748: the Physicalische Belustigunzen, or Philosophical Amusements, begun at Berlin in 1751. The Journal of Hanover begun in 1700, and continued for two years by M. Eccard, under the direction of M. Leibnitz, and afterwards carried on by others. The Theological Journal, published by M. Loescher, under the title of Altes and Neues, that is, Old and New. A third at Leipsic and Francfort, the authors Mess. Walterck, Krause, and Groschuffius; and a fourth at Hall, by M. Turk.

The English Journals are, the History of the Works of the Learned, begun at London in 1699. Censura Temporum, in 1708. About the same time there appeared two new ones, the one under the title of Memoirs of Literature, containing little more than an English translation of some articles in the foreign Journals, by M. de la Roche; the other a collection of loose tracts, entitled, Bibliotheca curiosa, or a Miscellany. These, however, with some others, are now no more, but are succeeded by the Annual Register, which began in 1758; the New Annual Register, begun in 1780; the Monthly Review, which began in the year 1749. See Criticism Periodical. *A Journal of Natural Philosophy, Chemistry, and the Arts*, was begun in 1797 by Mr. Nicholson, and has been conducted in such a manner, that it is one of the most valuable works of the kind to be found in any language; the Philosophical Magazine, begun in 1798 by Mr. Tilloch, and carried on upon much the same plan, and with much the same spirit, as Nicholson's Journal.

Besides these, we have several monthly pamphlets, called Magazines, which, together with a chronological series of occurrences, contain letters from correspondents, communicating extraordinary discoveries in

nature and art, with controversial pieces on all subjects.

JOU'RNALIST. *s.* (from *journal.*) A writer of journals.

JO'URNEY. *s.* (*journée*, French.) 1. The travel of a day (*Milton*). 2. Travel by land; distinguished from a voyage or travel by sea (*Rogers*). 3. Passage from place to place (*Burnet*).

To Jo'urney. *v. n.* (from the noun.) To travel; to pass from place to place (*Milton*).

JO'URNEYMAN. *s.* (*journée*, a day's work, French, and *man.*) A hired workman; a workman hired by the day (*Addison*).

JO'URNEYWORK. *s.* (*journée*, Fr. and *work.*) Work performed for hire; work done by the day (*Arbuthnot*).

JOUST. *s.* (*joust*, French.) Tilt; tournament; mock fight. It is now written less properly *just* (*Milton*).

To Joust. *v. n.* (*jouster*, French.) To run in the tilt (*Milton*).

JO'WLER. *s.* The name of a hunting dog or beagle (*Dryden*).

JO'WTER. *s.* A fish driver (*Carew*).

JOY. *s.* (*joye*, French.) 1. The passion produced by any happy accident; gladness; exultation (*South*). 2. Gayety; merriment; festivity (*Dryden*). 3. Happiness; felicity, (*Shak.*) 4. A term of fondness. (*Shak.*)

Joy, in the philosophy of the passions, is the vivid pleasure inspired on the immediate reception of something peculiarly grateful, or of something obviously productive of an essential advantage, or which promises to contribute to our present or future well-being. This delight may be communicated by our liberation from fearful apprehensions, or from a state of actual distress, by obtaining some new acquisition, some addition to our stock of enjoyment, or by the full assurance of this without any mixture of doubt. A sudden and instantaneous translation from extreme anxiety or the depth of distress, to an exalted pinnacle of happiness, constitutes the highest possible degree of joy.

On the first impulse of joy, we are perfectly passive. No effort of the will can check the sensation itself; and where the joy is excessive, it is not in the power of resolution to suppress every external sign. The state of passive impression is succeeded by the exertions of a vigorous imagination, which runs over, with rapid confusion, the many supposed advantages to be derived from the welcome treasure. These it is disposed to multiply and aggrandize far beyond the bounds of reason or probability. This pleasing, or we might almost say *intoxicated* state of mind, produces correspondent effects upon the system. A brisk and delectable flow of the animal spirits diffuses a pleasurable sensation over the whole frame. Every species of torpor is subdued, an exhilaration succeeds; indicating itself by emotions, which not only manifest the influence of the passion to spectators, but solicit their participation. The subject feels himself too much animated to remain in a tranquil state. Unusual vivacity in the eyes, and smiles upon the countenance, are accompanied by joyful acclamations, clapping of hands, and various other lively gestures. Where the mind is strongly agitated, and under no restraint from a sense of decorum, or solicitude for character; loud laughter, jumping, dancing, and the most wild and extravagant gestures, indicate the frolicsomeness of the heart. (*Cogan*, p. 54.)

To Joy. *v. n.* (from the noun.) To rejoice; to be glad; to exult (*Wotton*).

To Joy. *v. a.* 1. To congratulate; to entertain kindly (*Prior*). 2. To gladden; to exhilarate (*Sidney*). 3. (*jouir de*, French.) To enjoy; to have happy possession of (*Milton*).

JO'YANCE. *s.* (*joiant*, old French.) Gayety; festivity: obsolete (*Spenser*).

JO'YFUL. *a.* (*joy* and *full.*) Full of joy; glad; exulting (*Kings*).

JO'YFULLY. *ad.* With joy; gladly (*Wake*).

JO'YFULNESS. *s.* (from *joyful.*) Gladness; joy (*Deuteronomy*).

JO'YLESS. *a.* (from *joy.*) 1. Void of joy; feeling no pleasure (*Dryden*). 2. Giving no pleasure (*Shakspeare*).

JO'YOUS. *a.* (*joyeux*, Fr.) Glad; gay; merry (*Prior*). 2. Giving joy (*Spenser*).

IPECA'CUANHA, (*Ipecacuanha*, *æ*, f. Indian.) Ipecacuan. The plant from which this valuable root is obtained, was long unknown; it was said by some writers to be the psychotria emetica; class pentandria, order monogynia: by others, the viola ipecacuanha, a syngenesious plant of the order monogynia. But it has since been affirmed, chiefly upon the authority of Schreber, to be the root of a small plant which he denominates callicocca, a native of Brazil, and belonging to Jassieu's order rubiaceæ; under which designation it is referred to in the materia medica of the new pharmacopoeia of the London College. See Callicocca. There are three sorts of ipecacuan to be met with in our shops, viz. the ash-coloured or grey, the brown, and the white. The ash-coloured is brought from Peru, and is a small wrinkled root, bent and contorted into a great variety of figures, brought over in short pieces, full of wrinkled and deep circular fissures, down to a small white woody fibre that runs in the middle of each piece: the cortical part is compact, brittle, looks smooth and resinous upon breaking: it has very little smell; the taste is bitterish and subacrid, covering the tongue as it were with a kind of mucilage. The brown is small, somewhat more wrinkled than the foregoing; of a brown or blackish colour without, and white within: this is brought from Brazil. The white sort is woody, has no wrinkles, nor any perceptible bitterness in taste. The first, the ash-coloured or grey ipecacuan, is that usually preferred for me-

dicinal use. The brown has been sometimes observed, even in a small dose, to produce violent effects. The white, though taken in a large one, has scarcely any effect whatever. It is still highly probable that this last is the root of the viola ipecacuanha, which is a native of Brazil. Experience has proved that this medicine is the safest emetic with which we are acquainted, having this peculiar advantage, that if it do not operate by vomit, it readily passes off by the other emunctories. Ipecacuan was first introduced as an infallible remedy against dysenteries and other inveterate fluxes, as diarrhœa, menorrhagia, leucorrhœa, &c. and also in disorders proceeding from obstructions of long standing; nor has it lost much of its reputation by time. Its utility in these cases is thought to depend upon its restoring perspiration. It has also been successfully employed in spasmodic asthma, catarrhal and consumptive cases. Nevertheless, its chief use is as a vomit, and in small doses, joined with opium, as a diaphoretic. The officinal preparations are the pulvis ipecacuanhæ compositus, and the vinum ipecacuanhæ.

Ipeca'cuan False, or Bastard, in botany. See Asclepias and Triosteum.

IPHICRATES. The most celebrated of this name is a general of Athens, who, though son of a shoemaker, rose to the highest offices in the state. He made war against the Thracians, obtained some victories over the Spartans, and assisted the Persian king against Egypt. He died 380 B. C. When once reproached with the meanness of his origin, he observed, that he would be the first of his family, but that his detractor would be the last of his own. (*C. Nep.*)

IPHIGENIA, a daughter of Agamemnon and Clytemnestra. When the Greeks, going to the Trojan war, were detained by contrary winds at Aulis, they were informed by Calchas, the soothsayer, that, to appease the gods, they must sacrifice Iphigenia to Diana, because her father had killed the favourite stag of the goddess. He heard this with the greatest horror and indignation, and rather than to shed the blood of his daughter, he commanded one of his heralds, as chief of the Grecian forces, to order all the assembly to depart. Agamemnon, however, after much solicitation of other chiefs, consented to immolate his daughter for the common cause of Greece, but as soon as Calchas took the knife, and was going to strike the fatal blow, Iphigenia suddenly disappeared, and a goat of uncommon size was found in her place. This supernatural change animated the Greeks, the wind suddenly became favourable, and the combined fleet set sail from Aulis. Iphigenia's innocence had raised the compassion of the goddess on whose altar she was going to be sacrificed, and the goddess then carried Iphigenia to Taurica, where she entrusted her with the care of her temple, whence she afterwards fled with her brother Orestes and his friend Pylades.

IPHIS, son of Alector, succeeded his father on the throne of Argos (*Apollod.*) 2. A beautiful youth of Salamis, of ignoble birth. He became enamoured of Anaxarete, and the coldness and contempt he met with rendered him so desperate that he hung himself. Anaxarete saw him carried to his grave without emotion, and was instantly changed into a stone (*Ovid*). 3. A daughter of Ligdus and Telethusa, of Crete, was, in consequence of her sex, ordered by her father to be put to death, but Isis commanded her mother in a dream to spare the life of her child, and to educate her as if she were a boy. Ligdus continued ignorant of the deceit, and when Iphis was arrived to puberty, her father resolved to give her in marriage to Ianthe, daughter of Telestres. This involved Telethusa and her daughter in some perplexity, when Isis, on their entreaties, changed the sex of Iphis, and, on the morrow, the nuptials were consummated with the greatest rejoicings (*Ovid*).

IPOMŒ'A. *Quamoclit*, or *Scarlet Convolvulus*. In botany, a genus of the class pentandria, order monogynia. Corol funnel-form; stigma a globular head; capsule three-celled. Twenty-eight species, mostly with distinct, some few with aggregate flowers. Chiefly natives of the West Indies and South America, many of India, one or two of the Cape. Of the species chiefly cultivated in our own gardens is,

I. Quamoclit, by some gardeners called an Indian pink. Leaves pinnatified, linear, opposite, filiform; flowers mostly solitary, axillary red, with a very long tube. It is a native of India, and an annual plant, but will not bear the open air of this country. It is best propagated by seeds sown on a hot-bed in the spring, and as the plants will soon appear, they should be each transplanted into a small pot filled with light earth, to prevent their twining about each other, in which case it will be difficult to disengage them without breaking their tops. When they are potted, they should be plunged into a new hot-bed, and sticks placed down by each plant for their stalks to twine round. After they have taken new root, they should have a good share of air in warm weather, to prevent their drawing up weak; and when they are advanced too high to remain under the frame, they should be removed into the tan-bed in the stove, and have support, as their branches will extend to a considerable distance. In this place they will begin to flower in June, and there will be a succession of flowers till the end of September, and the seeds will ripen very well. All the other annuals of this genus are propagated from seeds, much in the same manner; the seeds of a few, however, may be sown on a warm border of light earth. In the spring the plants will come up, and in a

favourable season will flower and produce good seeds; but most gardeners raise the plants on a very gentle hot-bed, and transplant them afterwards into borders, by which method they are brought to perfect their seeds earlier. One or two sorts are perennial plants, and may be propagated by seeds, which must be sown in a hot-bed in the spring, and afterwards managed like the quamoclit.

IPS. In entomology, a Fabrician tribe of the genus SILPHA, which see.

IPS, a town of Germany, in the Archduchy of Austria. Lat. 48. 13. N. Lon. 15. 11. E.

IPSALA, a town of Turkey in Europe, with a Greek archbishop's see. It is seated on the Larissa. Lat. 40. 57. N. Long. 26. 10. E.

IPSERA, a small island in the Archipelago, 15 miles N. W. of the island of Scio.

IPSWICH, a borough of Suffolk, with markets on Wednesday, Friday, and Saturday. It is of great antiquity. It contains 10 parish churches, a guildhall, two hospitals, a free school, a customhouse, and a good quay. It is populous, but irregularly built. The number of houses is 2220, and of inhabitants 11,277. Its present commerce chiefly depends upon the malting and exportation of corn. It has a considerable coasting trade, a small share of foreign commerce, and sends ships to Greenland. It is noted for being the birth-place of cardinal Wolsey, and is seated on the Orwell. Lat. 52. 8. N. Lon. 1. 16. E.

IQUETAIA. The inhabitants of the Brazils give this name to the scrophularia aquatica, which is there celebrated as a corrector of the ill flavour of senna. See SCROPHULARIA.

IRAC ARABIA, a province of Turkey in Asia, bounded by the desert of Arabia, by Curdistan, Diarbeck, Irac Agemi, Kusistan, and the gulph of Persia. Bagdad is the capital.

IRAC-AGEMI, a province of Persia, bounded by Irac-Arabia, Kusistan, Aderbeitzan, Ghilan, Couhestan, and Farsistan. Ispahan is the capital.

IRA'SCIBLE. *a.* (*irascibilis*, low Latin; *irascible*, French.) Partaking of the nature of anger (*Digby*).

IRE. *s.* (French; *ira*, Lat.) Anger; rage; passionate hatred (*Dryden*).

I'REFUL. *a.* (*ire* and *full.*) Angry; raging; furious (*Dryden*).

I'REFULLY. *ad.* (from *ire.*) With ire; in an angry manner.

IREBY, a town in Cumberland, with a market on Thursday. Lat. 54. 30. N. Lon. 3. 18. W.

IREKEN, a rich and populous town of Tartary, the capital of Bocharia, with a castle. Lat. 41. 40. N. Lon. 73. 25. E.

IRELAND, a large island of Europe, separated from Great Britain by a narrow sea, indifferently called the Irish Sea and St. George's Channel, at various distances, according to the projections of each country; in some parts 40 leagues, between Scotland and the county of Down, about six, and from the county of Antrim to a part of Scotland, called the Mull of Kintyre, hardly four: the extent from north to south in a meridian line, 185 miles, the breadth from east to west, from 98 to 143; and the superficial contents are supposed to amount to about 19,000 square miles. The number of houses is about 700,000. Ireland is divided into four great provinces, viz. Ulster, Leinster, Connaught, and Munster, which are again divided into 32 counties, containing 3436 parishes. Ulster, which occupies the northern part of the kingdom, contains nine counties, viz. Antrim, Armagh, Cavan, Donegal, Down, Fermanagh, Londonderry, Monaghan, and Tyrone: Leinster, situated to the east, contains twelve counties, viz. Carlow, Dublin, Kildare, Kilkenny, King's County, Longford, Louth, Meath, Queen's County, Westmeath, Wexford, and Wicklow: Connaught, towards the west, contains five counties, viz. Galway, Leitrim, Mayo, Roscommon, and Sligo: Munster, which occupies the southern part of the kingdom, contains six counties, viz. Clare, Cork, Kerry, Limerick, Tipperary, and Waterford. The climate of Ireland is said to be more variable, and both heat and cold more moderate, than England. The air is certainly damper; but that quality, in the opinion of an ingenious and sensible writer, Dr. Beaufort, is not to be attributed entirely to the bogs which are scattered over the kingdom, but chiefly to its insular situation, and to the quantities of moist particles that are wafted from the ocean by the westerly winds, which most frequently prevail. The moisture, however, is not prejudicial to health, neither is the neighbourhood of bogs unwholesome. The bog waters, far from emitting putrid exhalations, like stagnant pools and marshes, are of an antiseptic and strongly astringent quality, as appears from their preserving for ages, and even adding to the durability of the timber which we find universally buried beneath their surfaces; and from their converting to a sort of leather the skins of men and animals, who have had the misfortune of being lost, and of remaining in them for any length of time. Thus does the vicinity of a bog widely differ from those apparently similar situations in other countries, which are rendered confessedly unhealthy by fens or marshes, but of which there are none in Ireland. Whether it be owing to the soil or the climate, certain it is, that in Ireland there are neither moles nor toads, nor any kind of serpents; and it is not more than 70 or 80 years since frogs, of which there are now abundance, were first imported from England. But though the same experiment has been made with snakes and vipers, it has happily

been unsuccessful. Wolves were extirpated by Oliver Cromwell. But if this island be free from some noxious, and all venomous creatures, it is, on the other hand, denied one of the sweetest of the feathered tribe. The nightingale is not to be found here, and when brought over in a cage, but lingers out a miserable existence for a short time. There are also some other birds, and several kinds of fish, which abound in England, but are unknown in Ireland. The soil of Ireland varies from the stiffest clay to the lightest sand; but of the latter there is not much to be met with, neither is chalk to be found in any part of it. It is in general much more stony than the soil of England; and in some districts the surface appears more than half covered with rocks. Great part of the kingdom lies upon a stratum of rock, at various depths, so that stone quarries abound every where: and much of this rock being lime-stone, it greatly contributes to enrich and improve the land. Marble of great beauty is found in several counties. Mines of coal, iron, lead, and copper, are not unfrequent; and many of them are worked to great advantage. The bogs, which supply most of the inland part of the country with fuel, produce on their surface heath, rushes, and coarse grass, with some other aquatic plants, and are generally pasturable in summer, especially on the sides of hills or mountains, and those which are in lower situations become excellent meadows when thoroughly drained. However the soil may vary, it is by nature remarkably fertile; and the pasturage is generally thought to be more luxuriant than in England; but in cultivation and good husbandry the Irish are still much behind their neighbours. Among the principal rivers of Ireland are the Shannon, Foyle, Bann, Liffey, Boyne, Slaney, Suir, Barrow, Erne, and Moy. Along the western coast are ranges of mountains, and in some other parts are some other mountains of considerable height, but not to so great a degree as to be called a mountainous country. Lakes are very numerous, and some of them of considerable extent: wood is wanting, but a spirit of planting will, it is hoped, remedy this inconvenience, for the benefit of posterity. Ireland is supposed by some to have been originally peopled from Spain, by others from Great Britain; but the ancient history is enveloped in darkness and uncertainty: however, it is generally thought Christianity was planted here at least as early as the 5th century, and that St. Patrick was engaged in propagating the Christian faith. In the 8th century, this island, as well as England, experienced the inroads of the Danes, who formed a settlement, and even when Henry II. first sent over with a design to conquer the country, were in possession of several towns on the coast. In the 12th century, Ireland was governed by five different kings, viz. of Ulster, Leinster, Meath, Connaught, and Munster, with many other petty princes, who were, perhaps, in some degree tributary to the others. Dermot, king of Leinster, having invaded the dominions and carried away the wife of Ororic, or O'Roirk, prince of Bressiny; the injured prince entered into an alliance with the king of Connaught, and expelled the tyrant from his dominions. Dermot fled to England to solicit the friendship of Henry II. offering to hold his crown in vassalage. Henry wanted little persuasion, as he had before entertained hopes of annexing Ireland to his dominions: Henry is called the conqueror of the island. His son, John, was created lord of Ireland, and, when he became king, gave them a body of laws; Henry VIII. was the first who assumed the title of king. Ireland is governed by a viceroy, appointed by the king, and before 1801 by a parliament, similar to the parliament of Great Britain, but totally independent of it, consisting of lords and commons, by whom all acts were passed before they became laws. The number of members returned to the Irish parliament by the counties, cities, and towns, was 300. But, during the year 1800, it was enacted both by the English and Irish legislatures, that, after January 1, 1801, the two separate governments of England and Ireland should be incorporated into one, the whole now forming the *United kingdom of Great Britain and Ireland*: the Irish members of parliament are now reduced to 100, who sit in the British House of Commons with the English and Scotch members. The established religion of Ireland is that of the English Church; but a majority of the people are Roman Catholics. Ireland contains four archbishoprics, viz. Armagh, Dublin, Cashel, and Tuam; and twenty bishoprics, namely, Dromore, Down and Connor, Derry, Raphoe, Clogher, Kilmore, Ardagh, Emly, Meath, Kildare, Ferns and Leighlin, Ossory, Waterford and Lismore, Cloyne, Cork and Ross, Limerick and Ardfort, Killaloe and Kilfenora, Clonfert and Kilmacduagh, Elphin, and Killala and Achonry. Ardagh is united to Tuam, and Emly to Cashel. Trinity College, in Dublin, is the only university in Ireland. Dublin is the capital. Lon. 5. 19. to 10. 15. W. Greenwich. Lat. 51. 22. to 55. 20. N. *Hibernia*, *Ierne*, *Ivernia*, and *Juverna*, were the ancient names of this island.

The number of inhabitants in Ireland, in 1731, was 700,453 protestants, and 1.309,768 papists; in all, 2.010,221. In 1754 the estimate gave 3 millions. In 1788, the number was about 3,900,000. And the estimates of 1809 gave 5,400,000 inhabitants, of whom more than three-fourths are papists.

IRENÆUS (St.), bishop of Lyons, and the disciple of Polycarp. He held a dispute at Rome with Valentinus, and held a council at Lyons, in which the heresies of the gnostics were formally condemned. He took great pains to terminate amicably

the dispute which was then begun about the time of celebrating Easter, and wrote many letters on the subject. He was beheaded at Lyons in the persecution under Severus, about A.D. 202. His books on heresies were edited by Grabe at Oxford, in 1702, folio.

IRESINE. In botany, a genus of the class dioecia, order pentandria. Calyx two-leaved; petals five, male, nectary five-scaled, between the stamens. Fem; stigmas two sessile, capsule with down seeds. One species only; a West Indian herb with weak stem and knotty joints; leaves ovate, entire glabrous: flowers in loose, terminal panicles.

IRIDIUM, a metallic substance, thus named by Mr. Tennant, on account of the striking variety of colours which it gives while dissolving in muriatic acid. It is obtained from the black powder which remains after dissolving platina: and was discovered much about the same time, about six years ago, by Mr. Tennant, in England, and by Messrs. Vauquelin and Descotils, in France. From the experiments of Mr. T. it appears to be soluble in all the acids, but least in muriatic acid, with which it forms octaedral crystals. If these crystals be exposed to heat, the oxygen and acid are expelled, and the metal is obtained in a state of purity: it is then of a white colour. Mr. T. was unable to melt it by heat. It is precipitated from its acid solutions by all the metals, except gold and platina; and partially so by the three alkalies. Galls and precipitate of potash take away the colour of the solution, but without any precipitate, and afford an easy test of its presence. When combined with gold or silver, it cannot be separated by the usual process of refining these metals. Two other metallic bodies have been obtained out of the powder which remains undissolved from the ore of platina; one by Mr. Tennant, which he calls Osmium; and the other by Dr. Wollaston, to which he has given the name of Rhodium. See those words.

IRIS, in physiology, the rainbow. The word is Greek, ἰρις, supposed by some to be derived from ἐιρω "I speak, I tell;" as being a meteor that is supposed to foretell, or rather to declare, rain. See Rainbow.

Iris Lunar, or Moon-rainbow. See Lunar Rainbow.

IRIS, in optics and anatomy. The anterior portion of the choroid membrane of the eye, which is perforated in the middle by the pupil. It is of various colours. The posterior surface of the iris is termed the uvea.

Iris. In botany, a genus of the class triandria, order monogynia. Corol six-parted, the divisions alternately reflected: stigmas petal-form. Fifty five species scattered over the globe, which may be thus sub-divided.

A. Bearded—leaves ensiform.
B. Bearded—leaves linear.
C. Beardless—leaves ensiform.
D. Beardless—leaves linear.
E. Beardless—leaves quadrangular. The following are the chief species.

1. I. Florentina. Florentine iris or orris. Bearded; leaves ensiform, glabrous, shorter than the scape; scape mostly two-flowered. A native of Italy and the south of Europe; in its recent state it is extremely acrid, and when chewed excites a pungent heat in the mouth, that continues several hours: on being dried, this acrimony is almost wholly dissipated; the taste is slightly bitter, and the smell agreeable, and approaching to that of violets. The fresh root is cathartic, and for this purpose has been employed in dropsies. It is now chiefly used in its dried state, and ranked as a pectoral and expectorant, and hence has a place in the trochissi amysi of the London Pharmacopoeia.

2. I. Germanica. Common iris or orris. Fleur-de-luce. Bearded; leaves ensiform, glabrous, falcate, shorter than the scape, scape many-flowered; tube as long as the germ: inner petals not emarginate; colour of the corol various. The roots have a strong disagreeable smell, and an acrid, nauseous taste. They are powerfully cathartic and are given in dropsical diseases where such remedies are indicated. The plant is a native of Germany.

3. I. Pseudacoms. Yellow water-flag. Beardless; leaves ensiform; inner petals less than the stigma; found in the wet woods, marshes, and on the river banks of our own country. As a medicine it formerly had a place in the London Pharmacopoeia under the name of gladiolus luteus. The root is without smell, but has an acrid styptic taste, and its juice, on being snuffed up the nostrils, produces a burning heat in the nose and mouth, accompanied by a copious discharge from these organs; hence it is recommended both as an errhine and sialagogue. Given internally, when perfectly dry, its adstringent qualities are such as to cure diarrhœas. The expressed juice is likewise said to be an useful application to serpiginous eruptions and scrofulous tumours.

IRISH Slate. See Lapis Hibernicus.

To IRK. *v. a.* (*yrk*, work, Islandic.) This word is used only impersonally, *it* irks *me;* it gives me pain; or, I am weary of it (*Shakspeare*).

I'RKSOME. *a.* (from *irk.*) Wearisome; tedious; troublesome; toilsome (*Swift*).

I'RKSOMELY. *ad.* Wearisomely; tediously.

I'RKSOMENESS. *s.* (from *irksome.*) Tediousness; wearisomeness.

IRKUTSK, the largest and least populous government of Russia, comprising all the E. part of Siberia. Its chief town is of the same name: it is the see of a Greek

bishop, and situate on the lake Baikal. Lat. 52. 4. N. Lon. 104. 58. E.

IRON, *Mars, Ferrum*, the most useful, and the most plentiful of the metals. Its colour is too well known to need specifying here; that it is susceptible of a fine polish, is also well known. When broken, it appears to be internally composed of small shining facets. It is the most elastic of metals; and, next to platina, is the most difficult of fusion. Its hardness in some states is superior to that of any other metal; and it has the additional advantage of suffering this hardness to be increased or diminished at pleasure by certain chemical processes. Its tenacity is greater than that of any other metal, except gold: an iron wire the tenth part of an inch in diameter, has been found capable of sustaining more than 500lb. without breaking. Its ductility is such as to allow it to be drawn into wire as fine as hair. But these, and other properties of this metal, vary with the method of preparing it; the ore from which it is obtained, and the degree of purity to which it is brought. To specify all the uses of this valuable metal would occupy too much of our room, and, happily, this is unnecessary; for we are constantly surrounded with innumerable proofs of its utility, and presented with reasons for acknowledging the important services it renders us.

It differs from others of the metals in one very material respect: its abundance is in proportion to its intrinsic worth. It is very generally diffused throughout the globe, being frequently found mixed with sand, clay, chalk, and being likewise the colouring matter of a great number of stones and earths. It is found also in the ashes of vegetables, and in the blood of animals, in such abundance, that some authors have attributed both the colours of vegetables and of the vital fluid itself, to the iron contained in them. In consequence of this abundance, the iron ores are extremely numerous: the principal of them are noticed in our article FERRUM.

The ores from which iron is generally obtained in Britain are those which by some are called secondary ores, but which are better known by the name of IRON STONES. Cumberland and Lancashire, however, afford a primary ore, more rich in metal, but not so well adapted for smelting with pit-coal. Of the iron-stones, there are several varieties, consisting of various proportions of lime, clay, and silex, in combination with the metal: those of the argillaceous kind, or those in which clay predominates, are found, upon the whole, to answer best in working; though the other kinds, by adopting proper variations in their treatment, may be made to yield very good iron.

In the separation of iron from these ores, after a specimen has shewn them, by the assay, to be worth working, the first process is torrefaction, or roasting, or as it is less properly styled by the manufacturers, calcination; the object of which is to free the mineral from the sulphur, air, water, and other volatile bodies which it may contain. In some parts of Wales the torrefaction is performed in kilns or conical furnaces; but in England and Scotland, it is done by exposing iron-stone, stratified with coals, to combustion in the open air. See IRON MANUFACTURE.

The iron obtained by smelting is called *crude-iron*, cast-iron, or pig-iron; and is yet far from a state of purity. Cast-iron is scarcely malleable at any temperature; it is generally so hard as to resist the file; it can neither be hardened nor softened by ignition and cooling. It is exceedingly brittle; often breaking by merely being let fall upon the ground. It melts at about 130 of Wedgewood's pyrometer. For the most part it is of a dark grey or blackish colour; but sometimes it is whitish, and then it contains a quantity of phosphuret of iron, which considerably impairs its qualities. In the state of cast-iron, the metal, as is well known, is applied to an immense number of purposes, and used in the formation of a great variety of articles, both for ornament and for use.

To refine crude iron, and render it malleable, it is necessary to free it from its impurities, and to expel the carbon with which it is combined. For this purpose the pigs of iron are melted in an open charcoal fire, by means of which the scoria and grosser impurities are deposited, and are then conveyed to a reverberatory furnace, where the flame continually playing upon the melted metal, it is kept stirring by a workman, that every part of it may be exposed to the air: this is called the puddling process. In about an hour the hottest part of the mass begins to heave and swell, and to emit a blue lambent flame. This continues nearly an hour; and by that time the property of malleability is acquired. As the process advances, the iron gradually increases in consistency; and, if not speedily removed, would, notwithstanding the heat, congeal altogether in a mass. At this juncture, it is subjected to the action of a very large hammer, driven by machinery, or exposed to the more equal but less forcible pressure of large iron rollers. This not only makes the particles of iron approach nearer each other, but drives away several impurities which would otherwise continue attached to the iron. It is then either formed into bars, and distinguished by the name of bar-iron, or slit into rods, or beaten or rolled into sheets, for the innumerable purposes to which this inestimable metal, in its state of malleability, is capable of being applied.

Malleable iron ought to possess no foreign mixture whatever, to be in a state of purity; but as the modes of operation have hitherto consisted in manufacturing this state of the metal from crude iron, and as crude iron is always found to contain principles inimical to malleability, it is obvious that the quality of malleable iron will at all times depend upon the degree of expulsion of the alterative mixtures contained in the crude iron; the destruction of which, and the consequent malleabilization of the iron, constitute the universal acknowledged principles of bar-iron making. The varieties of forged iron, resulting from these principles, are the three following:—*Hot-short* iron, which, though extremely malleable and ductile when cold, is so brittle when heated, that it will not bear the weight of a small hammer without breaking to atoms: it is also extremely fusible in a high temperature. 2. *Cold-short* iron, which possesses the opposite qualities, is infusible in the most violent heat, and though capable, while hot, of being beaten into any shape, is when cold, very brittle, and but slightly tenacious. With the causes of these different qualities, though many opinions have been advanced by chemists, we are still but imperfectly acquainted. 3. Iron partaking of none of these evils, and which may be so far denomi-

nated pure malleable iron, though the metal itself, in a chemical view, may not be perfectly free from every foreign admixture. It is in this third state that we consider it as more particularly belonging to our present article; and as possessing the properties with which our account was introduced, as well as a great number of others which yet remain to be mentioned.

It is worthy of remark, by the way, that an art which we seem not even to indulge the hope of attaining, is said by Mr. Eaton, in his Survey of the Turkish Empire, to have been once known to an Arabian, but, unhappily, to have perished with him. Mr. Eaton states the following instance of it as having occurred to his own knowledge:—An Arabian of Constantinople had discovered the secret of casting iron, which, when it came out of the mould, was as malleable as hammered iron. Some of his fabrication was accidentally shewn to M. de Gaffron, the Prussian chargé d'affaires, and M. Franzaroli (men of mineralogical science), who were struck with the fact, and immediately instituted an inquiry for its author. This man, whose art in Christendom would have insured him a splendid fortune, had died poor and unknown, and his secret had perished with him. His utensils were found, and several pieces of his casting, all perfectly malleable! M. Franzaroli analyzed them, and found that there was no admixture of any other metal. M. de Gaffron has since been made superintendant of the iron manufactory at Spandau, where he has in vain attempted to discover the process of the Arabian. If the possibility of the thing be but fairly established, we have every thing to hope, as to the attainment of it, from the ingenuity and perseverance of our countrymen. Whatever variety may exist in the modes of operation at different works, and in different countries to render iron malleable, the principle of operation is the same in all, namely, that by dissipating the carbon and oxygen contained in the crude iron, pure or malleable iron is the result; and we see no absurdity in allowing it to be possible that this expulsion may be effected in the process of casting, or even during some of its preliminary operations. It is probable, however, that to secure malleability, it will be necessary to lay some restraint upon the crystallization of the iron in cooling; but as mere speculation on a practical subject is of little utility, and as we can do nothing but speculate here, we must leave to practical men and to experiment the determination of the matter.

The chief chemical properties of this metal, refined and rendered malleable, are the following:

1. When applied to the tongue, it has a styptic taste, and emits a peculiar smell when rubbed.

2. Its specific gravity varies from 7·6 to 7·8; a cubic foot of its weight about 580lb. avoirdupois.

3. It is attracted by the magnet, or loadstone, and is itself, in one of its ores, the substance which constitutes the loadstone. See FERRUM. 8. It is also capable of acquiring itself the attraction and polarity of the magnet, in various ways.

Although the property of being magnetic is not peculiar to iron, yet the other metals in which it has been found possess it in so slight a degree as will not bear a comparison with its strength in this substance. By this property it is admirably fitted for the purpose of making needles for the mariner's compass. See MAGNETISM.

When iron, however, is perfectly pure, it will retain the magnetic virtue a very short time.

4. It is malleable in every temperature, and its malleability increases as the temperature rises. it cannot, however, be hammered out nearly so thin as gold or silver, or even copper. Its ductility is very great; and its tenacity is such, that an iron wire ·078, or rather less than one-twelfth, of an inch in diameter, is capable of supporting 549¼ lb. avoirdupoise without breaking.

5. It melts at about 158° of Wedgewood.

6. It combines very readily with oxygen, as experience is continually shewing us, in various ways. When exposed to the air, its surface is soon tarnished, and it is gradually changed into a brown or yellow powder, usually called RUST. This change takes place more rapidly if the atmosphere be moist, and is occasioned by the absorption of oxygen by the iron. As carbonic acid is absorbed at the same time, and unites with the metallic oxyd, the composition thus formed is now termed *carbonat of iron*. To preserve iron, especially when polished, from rusting, various methods have been devised, with more or less success. Among others, that partial oxydation, known by the term *blueing*, has been adopted: this consists in heating the metal till it assumes the proper colour, and then heating and polishing it. The following method, practised by Conté, is pointed out in the VIth Vol, N. S. of Nicholson's Journal. It consists in mixing with fat oil varnish, at least half, or at most four-fifths, of its quantity of highly rectified spirits of turpentine. This varnish must be lightly and evenly applied with a spunge; after which the article is left to dry in some situation not exposed to the dust. He affirms that articles thus varnished retain their metallic lustre, and do not contract any spots of rust. This varnish may also be applied to copper, of which it preserves the polish, and heightens the colour. It may be employed with particular advantage to preserve philosophical instruments from any change. The strong affinity of iron for oxygen is also shewn by its power of decomposing water; which may be done either by keeping iron filings in water at any temperature not under 70°, or more speedily, by pouring hot water upon them, or by causing the steam of water to pass through a red hot iron tube, which decomposes the water instantly, and converts the inner surface into an oxyd. It is possible also to oxydize an iron wire by burning it in oxygen gas. According to Proust, there are only two distinct oxyds of iron: the first, or protoxyd, may be formed by either of the three methods just mentioned, or by dissolving the metal in sulphuric acid, and precipitating the oxyd by pouring potash into the solution. This oxyd, when properly prepared and pulverized, constitutes the substance long known by the name of *Martial Ethiops*. It is capable of crystallizing, and is often found native in that state. The second, or peroxyd, may be obtained by keeping iron filings red hot in an open vessel, and agitating them constantly till they are converted into a dark red powder. This oxyd was formerly called *Saffron of Mars*; and, with the addition of carbonic acid, forms the common rust of iron. It may also be prepared by precipitation, by means of an alkali, from a diluted solution of iron in sulphuric acid, after long exposure to the

atmosphere. The protoxyd is composed of 73 parts of iron and 27 of oxygen; and the peroxyd of 52 of iron and 48 of oxygen.

7. Iron is capable of forming a variety of salts by dissolution in the acids, all which may be readily made to act upon it, though with different degrees of facility and of effect. These salts will be found described, and the modes of preparing them pointed out, in connection with the names of the respective acids which enter into their composition. See the table of Acids, and the articles they refer to. It is in these combinations that iron is of such extensive use in dyeing and many other arts, and in forming the characteristic properties of copperas, vitriol, Prussian blue, ink, &c. &c.

8. Iron may be made to combine with all the simple combustible bodies. With sulphur, it forms a sulphuret of iron, which when found in the very common state of an ore, has been denominated *martial pyrites*; with phosphorus it forms phosphuret of iron, called *siderum* by Bergman; with carbon it forms carburet of iron, which, according to the proportion of carbon which enters into the compound, is distinguished by different names:—When found native, it is usually in the form of Plumbago, or *black-lead*; and in this state it appears, from the experiments of the French chemists, to be composed of about nine parts of carbon and one of iron. Cast iron and steel are also carburets of iron, or, as Dr. Thomson, from the small portions of carbon which they contain, denominates them, subcarburets; the first, however, has much more carbon than the second: for the process of making steel, and the properties of this valuable material, see the word. From the experiments of Mr. Mushet, of the Calder Iron-works, whose excellent papers in most of the volumes of the Philosophical Magazine are highly interesting, and from whose researches much may be expected, the following table of the comparative proportions of carbon in different compounds, was deduced by himself. Having employed charcoal in the conversion of iron to the different states here mentioned, he noticed the following results:

Charcoal absorbed.	*Result.*
$\frac{1}{120}$	Soft cast steel.
$\frac{1}{100}$	Common cast steel.
$\frac{1}{90}$	The same, but harder.
$\frac{1}{50}$	The same, too hard for drawing.
$\frac{1}{25}$	White cast iron.
$\frac{1}{20}$	Mottled cast iron.
$\frac{1}{15}$	Black cast iron.

From this statement it appears that steel does not contain, upon an average of the experiments, nearly half so much carbon in proportion as crude iron; that crude iron and steel only differ from each other in the proportion of the carbon they contain; and that, though the maximum of hardness is produced by about one-fiftieth part of charcoal to the iron, yet the maximum of utility, with respect to steel, is attained by the proportion of about one-hundredth part, or half the quantity, in combination with the iron.

9. Iron is capable of forming alloys, by combining with most of the metals; but as these alloys have not been much examined, and have seldom, if ever, been applied to any useful purpose, we think it needless to specify them.—*Phil. Mag.* several vols.; *Nich. Journ. Mushet, Thomson, Rees, Fourcroy, Eng. Ency. Macquer, Accum*, &c. &c.

Iron constitutes a part of the red globules of the blood of all quadrupeds, and is found in no part of the animal body but the red globules. It has hence been supposed to give vigour to the constitution, and to form the colouring matter of the blood itself. But there are great difficulties in the way of both these hypotheses; and the real utility of the iron that exists in the blood is not at present decisively ascertained. See upon this subject the article Blood.

The utility of iron in the practice of physic is very considerable. It is the basis of many important medicines, which are frequently employed with the happiest success. It may be said to be the only metal which is not noxious, and whose operation is not to be feared. The effects of this remedy upon the animal economy are various. It gives energy to the nerves and muscles, increases the secretions in general, especially the menstrual discharge, and excites the action of the heart and arteries. Nor is its action less effectual on the fluids: it is readily carried into the blood, combines with it, renders it of a darker colour, and imparts to it a more healthy consistence, it is therefore a tonic and alterative, and unites in its operation the properties of a great number of other medicines. Like adstringents, it increases the motion of the parts, and has the advantage of being more constant and durable in its effects than many other remedies which possess the same virtue, because it combines with the organs themselves, by means of the fluids, which serve for their nutrition. It appears, therefore, that in every case wherein the muscular and nervous fibres are feeble in their action, in debilities of the stomach and intestines, and diseases dependent thereon; in short, in every case wherein the blood has not a sufficient quantity of cruor, or has not its healthy degree of consistency, steel medicines may be administered with success. The officinal preparations in the pharmacopoeias are very numerous. If iron be exposed to the action of the air, it becomes oxydated, and is converted into the oxydum ferri luteum. See *Rubigo ferri*.—Submitted to the action of diluted sulphuric acid, by concentrating the solution by evaporation, it forms the sulphas ferri. See *Ferrum vitriolatum*.—With muriatic acid, it forms the murias ferri, the ferrum salitum of Bergman, from which the tinctura ferri muriati is made. Iron filings sublimed with the muriate of ammonia, or sal ammoniac, form the Murias ferri ammoniacalis. See Flores martiales.—With the powdered crystals of tartar, it forms the Tartris potassæ acidulus ferratus. See *Ferrum tartarisatum*.—Iron, possessing the magnetic property, is said to produce very singular effects upon the animal economy; and it is affirmed that, when applied to the skin, it mitigates pain, diminishes convulsions, excites redness, sweat, and often a small eruption. How far these assertions are to be depended upon is uncertain; but that the magnet has very sensible effects, is proved by Thouret, in the Transactions of the Royal Society of Medicine of Paris.

Iron Manufacture.

Under this head we propose to treat of the various processes for reducing iron from its ores,

into the state of *crude* and *malleable iron:* for the subsequent process, of converting the latter into STEEL, we refer to that article.

Iron is never found in a metallic state, but always as an oxyd; from the great affinity between oxygen and iron, they are always found combined when in the natural state; this compound is called ore, and has none of the metallic properties or appearance exist, except in its specific gravity: the red rust of iron is of this nature, being iron combined with oxygen; the ores of iron which are found in the earth always contain extraneous matters, besides iron and oxygen; the most volatile of these, are first expelled by calcination of the ore, and afterwards, by the operation of the blast furnace, the iron is separated from the oxygen and converted into cast or crude iron. This is done by exposing the ore to a most intense heat, at the same time that it is in contact with carbon supplied from the fuel: at this temperature the affinity between the oxygen and the carbon is greater than the former for the iron; a new combination is therefore formed of carbon and oxygen, leaving the iron still mixed with its impurities; a second combination of the carbon with the iron now takes place, which produces carbonated or cast iron; but in the practical application of this principle, the operation is not so perfect as to totally remove the oxygen. Some kinds of cast iron have less of it remaining than others, but are proportionally charged with carbon: this process of reviving iron from its ore is called *smelting iron,* or *iron making,* and in this state iron is now most extensively used, by casting into all varieties of articles; though formerly cast iron was little regarded, except as a material for the manufacture of bar or malleable iron. To reduce it to this state, the crude iron undergoes a particular management, in a furnace called a *finery,* by which its carbon and any remaining oxygen are volatilized, leaving malleable iron, which is consolidated and manufactured into bars by the action of immense hammers or rollers, moved by machinery. The conversion of iron into steel is a subsequent process of cementation in charcoal, by which malleable iron becomes steel.

From this slight sketch it will appear that the manufacture of iron is divided into two branches; first, the smelting of iron from the ore; second, the conversion of crude into malleable iron, by expelling the carbon and oxygen contained in the former.

HISTORY OF THE IRON MANUFACTORY.

The invention of this important branch of metallurgy is involved in great obscurity: as iron is never found in a metallic state, its existence, as well as the processes of reduction, must have been a human discovery. At what period the state of society was so greatly improved, we are uncertain, though we have every reason to suppose it very remote. In our present state, when we depend so greatly upon the use of iron and steel, it is difficult to conceive how man could exist in a state of society without their aid; yet we are informed by Captain Cooke, that the natives of the South Sea islands are wholly ignorant of the existence of any metals. From the Scriptures we learn that but a short time after the creation, Tubal Cain, a descendant of Cain the son of Adam, was "*an instructor of every artificer in brass and iron,*" though no mention is made of the manner by which he acquired these curious arts. The ancient mythologists, attributed the invention to Vulcan, the god of subterranean fire and metals, who Sir Isaac Newton supposes to have been the same with Cinyras, king of Lemnon, an inventor of the art, who found out copper in Cyprus, the smith's hammer, anvil, and tongs, and employed workmen in making armour and other things in brass and iron. He was the only king celebrated in history for working in metals.

Herodotus says, that a class of men called *Curetes,* who were celebrated for their skill in the arts and sciences, were brought into Greece, from *Phoenicia,* by *Cadmus,* son of *Agenor,* king of that country, some settled in *Phrygia,* and were called *Corybantes;* others in *Crete,* where they were called *Idaci Dactyli;* some in *Rhodes,* called *Telchines;* some in *Samothrace,* and were then called *Cabiri;* others in *Euboea,* where, before the invention of iron, they worked in copper, in a city called *Chalcio;* some in *Lemnos,* where they assisted *Vulcan;* and some in *Imbrus* and other places. By the assistance of these artificers, *Cadmus* discovered gold, in the mountain *Pangaeus,* in *Thrace,* and copper at *Thebes:* whence copper ore is still termed *Cadmia.* In the countries where they settled, they first wrought in copper till iron was discovered, and then in iron; they made arms and edged tools, for hewing and carving wood, which gave Minos, king of Crete, an opportunity of building a fleet, and gaining dominion of the sea, and of establishing the trades of smiths and carpenters in Greece. A short time after, *Daedalus* and his nephew *Talus* invented the saw and the axe, the whimblet, the perpendicular and compasses, the turning lathe, glew, and potter's wheel, and Epalamus invented the anchor: these were in the reign of Solomon. The invention of iron by the Idaci Dactyli, is by Sir Isaac Newton, fixed at about 1035 years before Christ, which it is said they discovered from the fusion of minerals, at the accidental burning of the woods on the mountain Ida in Crete: others make it 400 years earlier. It seems, however, that the historians of antiquity have in most cases, either attributed the discovery of metals to their gods, or they have deified those to whom mankind are so highly indebted, for having by that means been the founders of the present state of society.

On the modern history of the iron manufacture in England, we must be concise, as our limits will scarcely allow us to do justice to what is infinitely more important, its various processes, and the principles upon which they are founded.

The smelting of iron was formerly performed with charcoal of wood, used as fuel, in the same manner as it now is on the continent: previous to the period when every spot of land became cultivated, fire-wood was the chief produce of England, a circumstance peculiarly favourable to the manufacture of iron. Accordingly, we find it was in a very flourishing condition in the reign of King James the First; from which time the decrease of wood caused it to decline so greatly as to be nearly lost; until about forty years ago, when the perfecting of the process of making iron with pit coal placed it upon such a permanent basis, that it is capable of being extended to any magnitude, without affecting the agricultural interests of the country; as the iron, though it produces so much, costs nothing that is otherwise useful, but the labour of its reduction,

IRON.

When the minister in the year 1806 proposed to levy a tax on the manufacture of iron, and submit its various processes to the constant inspection of excise officers, the owners of the 133 iron-works which then existed in Great Britain, met in the several districts, and deputed fourteen of their number to assemble in London and arrange the information submitted to the committee of the House of Commons, on the bill for imposing this tax; shewing its impolicy and ruinous tendency on a manufacture which is essential to the success of almost all the branches of British industry. Through the kindness of one of these deputies, we are enabled to present the following abstract of the several iron furnaces, which in the spring of 1806 were working with cokes of pit coal in England, Wales, and Scotland, viz.

No. of Works.	Counties.	No. of Furnaces. In Blast	Out	Total	Tons of Pig Iron made annually	Average Tons per Furnace
4	Cumberland	4	—	4	1,491	373
11	Derbyshire	12	6	18	10,329	861
2	Gloucestershire	2	1	3	1,629	815
3	Lancashire	2	2	4	2,500	1,250
1	Leicestershire	—	1	1	——	——
3	Monmouthshire	3	—	3	2,444	815
19	Salop	28	14	42	54,966	1,963
25	Staffordshire	31	11	42	49,460	1,595
14	Yorkshire	23	4	27	26,671	1,160
82	Total in England	105	39	144	149,490	1,424
25	South Wales	36	11	47	75,601	2,100
3	North Wales	3	1	4	2,075	692
12	Scotland	18	9	27	23,240	1,291
122	Total of Coke Furnaces in Great Britain	162	60	222	250,406	1,546
11	Old Charcoal Furnaces still in use, in different Counties	11	—	11	7,800	709
133	Total in Great Britain	173	60	233	258,206	

Whence it appears, that the 133 furnaces which were then standing in Britain, were producing 258, 206 tons of crude iron annually; although the quantity had been estimated twelve years before not to exceed 100,000 tons per annum.

That 60 of these furnaces, or nearly one-fourth of their whole number, were out of blast, or standing still, is attributed in great part to the frequent and periodical repairs which the lining and hearth of a blast furnace require, while other furnaces had been blown out, or ceased to work, owing to a temporary failure of their supply of iron-stone or coals within the owner or lessee's lands: for it is to be remarked, that nearly the whole of the iron smelting is carried on under leases, and very rarely by the land owners themselves.

It appears above, that 1546 tons of pig iron is the average produce of each of the 162 coke furnaces in blast; and it may be interesting to some of our readers to be informed, that at some of these, as at Cyfarthfa in South Wales, the average per furnace is as high as 2615 tons per annum; while in 13 others the quantity falls below 500 tons, being at Dewey, in North Wales, stated at only 150 tons per annum: the average for each county, as well as for the charcoal furnaces, will be seen in the last column of the above table.

The average quantity made at each of the 121 coke iron works is 2070 tons per annum; seventeen of these works make 4000 tons each or upwards; the seven largest are Cyfarthfa, in South Wales, 10,460 tons; Old Park, in Salop, 8359; Blackmour, in South Wales, 7846: Pennydarran in ditto, 7803; Ketley, in Salop, 7510, and Carron, in Scotland, 7380 tons per annum: while at the same time eleven of these works fall short of 500 tons in the quantity which they make. The three least of these are stated to be Golden Hill, in Staffordshire, 184 tons; Dutton, in Cumberland, 175; and Dewey, in North Wales, 150 tons of pig iron per annum.

Ninety-five thousand tons of this pig iron, manufactured in Great Britain, are afterwards rendered malleable. The capital employed in the manufacture of the raw material only, is estimated at five millions; and it furnishes employment to 200,000 persons, independent of all the labour necessary to fabricate articles of iron.

On Iron Ores.

The minerals containing iron are very plentiful, though the richest ores alone are manufactured, and these only in countries where coals or wood can be procured in unlimited quantities. The ore is frequently found bedded in stratum of laminated clay termed bind, and partaking of the same inclination as the strata above and below. It is found in nodules nearly the shape of a convex lens, and of all sizes; these are termed iron stones: when broken, the internal fracture presents the most elegant configurations, tending

in general to a centre; others contain the impressions of vegetables, some bearing resemblance to ferns. In some cases the stones contain impressions of fossil shells. Iron ore is not unfrequently found in a regular stratum, occupying the whole space between the strata above and below it. When the strata (usually a laminated blue or ockery clay) which contains the iron stones are not more than 25 or 30 feet in depth, they are procured by sinking a pit at first, about eight feet diameter, which is enlarged as the depth increases, until the iron stones are reached, the pit is undermined until it becomes near 20 feet diameter, and of a conical figure; when all the stones contained in the pit are taken out, another is dug so near the former that it will meet it at the bottom: the earth taken from the second pit is thrown into the first, and in this manner the work proceeds, until the depth becomes greater: it is then the most economical method to work a mine under ground in the same manner as for coals. It frequently happens that an iron furnace is situated, where coals are mined at a considerable depth while the ore is procured nearer the surface, by this method the same expense of machinery for drawing off the water serves for both.

Iron stones are distinguished by Mr. Mushet into Silicious, Argillaceous, and Calcareous, in proportion as sand, clay, or lime are found predominant in them; though none are found free from mixture of all three. These circumstances effect the quality of the iron extracted from them, and require a somewhat different treatment to produce as much as possible similar results: for as the metal contained in all iron ore is the same, but differing in the foreign matters combined with them, it is possible to separate it from them, and in the manufacture this is chiefly done by varying the proportions of fuel and flux used in the furnace.

Iron masters consider that with the same proportion of fuel the best iron will be produced from the argillaceous ores; that is, respecting strength and a moderate degree of fusibility.

Calcareous ores afford iron which melts easily, though it is deficient in strength; when manufactured into bar iron it becomes *red short;* that is, brittle when hot.

The metal produced from iron stones, containing nearly equal mixtures of sand, clay, and lime, has an intermediate degree of fusibility and softness; but generally very strong. The worst crude iron is obtained from argillaceous ore: it is unfit for any purpose in this state, and when rendered malleable is *cold short*, or brittle when cold.

The first operation to which the iron ore is subjected, is roasting; this is exposing the stones to a moderate heat, which volatilizes many extraneous mixtures of the ore. The operation is performed by spreading upon the ground a layer of coals, about eight or nine inches thick, and extending from 10 to 12 feet in length, the breadth being about eight or nine feet: these coals are covered with a stratum of ore five or six feet in thickness, and interspersed with coke dust and small cinders; the whole is covered over with slack or small coals. The fuel is now set on fire, and suffered to burn as long as any matter capable of supporting cumbustion remains; which will be sometimes three weeks or a month. The ore, by this operation, loses very considerably in weight; its colour is changed from a dark brown to that of the red oxyde of iron, a change which is probably owing to the increase of oxygen furnished by the decomposition of the water contained in the ore whilst the hydrogen is dissipated. The reduction of weight is owing in a great measure to the decomposition of the water as well as the absence of any other matters which may be volatilized by that heat. It is found by experience, that if the roasting is imperfectly performed or omitted, the quality of the iron made from it is greatly injured; which is attributed by practical men to the loss of heat, which is sustained by introducing raw ore into the furnace. Iron stones vary in their products of iron from 15 to 35 per cent. by weight, of the raw ore.

The Fuel for making Iron.

Charcoal of wood stands foremost under this head, from the excellent quality of iron it produces. But we have little to offer our readers upon this subject, as very few charcoal furnaces are now used in England, and their number every day diminishing; being almost entirely superseded by coke furnaces within a few years. We shall therefore confine ourselves to coke-iron, first glancing at the idea of some French chemists, who, in a recent memoir, attribute the superiority of charcoal iron to the new-discovered metaloid potasium contained in the charcoal entering into combination with the iron.

Pit coals may be divided into three sorts:

1st. Hard or stone coal, which burns to a white ash, but is not remarkably inflammable.

2d. Soft or bright coal, which burns to a white ash, contains much hydrogen gas, and is the most inflammable.

3d. Crozling or caking coal is that which when burnt the fragments unite and melt into a mass, such coal usually burn to a red ash.

Of these varieties only the hard and crozling are deemed proper for iron making; the soft coal not running together in the operation of coking, so as to produce large pieces of coke: and indeed many kinds of crozling coals are too soft for the furnace, though they produce excellent large cokes for malting, and other purposes; but when in the furnace, are crushed to dust by the great weight of the other materials.

The coals for the blast furnace must be first burnt to cokes: which is done in heaps of from 20 to 60 tons; the large pieces of coals are first stacked up upon the ground, and the interstices filled with smaller coals; this heap is set on fire, and as the different parts become sufficiently burned, the fire in such parts is extinguished by covering it up with dust and the ashes of a former process. Cokes should be so much burnt as to expel all the hydrogen gas, which is known by the smoke ceasing; at the same time as little as possible of the coal should be destroyed by being burnt to ashes. In some places the cokes are burnt in an oven, and the fire put out by closing its mouth instead of smothering it with dust. A great difference prevails in the different kinds of coals, as to the quantity of coke they will produce and also in the quantity of carbon such cokes contain: the soft kinds of coal termed dicey from breaking into small rhomb, afford coke which is very brittle and spongy; when in the furnace the iron masters say it will not bear a burden of ore, that is, it requires a larger proportion of such coke to revive a given quantity of iron than of the cokes made from hard or stone coal; which they ascribe not so much to a deficiency of carbon, as to its softness which

causes it to give way and let the ore fall down to the hearth before it is sufficiently cemented by contact with the carbonaceous matter.

THE BLAST FURNACE.

We now come to describe this principal agent in the iron manufacture. In plate 89, which contains a plan and elevation of a furnace, with its appurtenances, AA, represents what is called the stack of the furnace of a pyramidal figure, 30 feet square at the base, and 40 feet in height, B, B, is the casting house, D is the house for the steam engine which gives motion to the blowing engine, to supply the furnace with air, *a* is its chimney, *b* the boiler with the fire place beneath it: the plan shews two such boilers either of which will supply the engine when the other is out of repair. The two dark circles *e e* in the plane are holes which convey the coals down to the arch before the fire place of each boiler; *f* is the steam pipe leading to the cylinder; *h* is the great lever or beam of the engine, alternating upon its centre and communicating the motion of the piston to the blast cylinder E. which is a large lifting pump as shewn in fig. 3. of plate 2. The engine is of the atmospheric principle, which, with its construction and operation are detailed under the article STEAM ENGINE; it is sufficient here to say that the alternate motion of the piston of the blowing cylinder, forces its contents of air at each stroke through the pipe *i*, into the regulating receiver F, which is an immense chest formed of cast iron plates open at the lower side and inverted in a reservoir of water about 12 feet in depth. The air is conveyed from the regulator to the furnace by pipes *k k* proceeding from each end of the chest to the furnace. Those furnaces which possess the command of a water fall are blown by an engine similar to that described under our article BLOWING ENGINE, either with or without the addition of a regulator.

The blowing cylinder E. is only of single power, that is, it throws out air only on the ascent of its piston; and it is the office of the regulator F. to receive this air at intervals and deliver it regularly into the furnace; and at every stroke of the engine, a quantity of water is displaced from the reservoir, by the engine throwing more air into it, than the two nose pipes at the ends of the pipes *k k* will convey away in the same time; it therefore distends the capacity of the receiver by expelling a portion of the water and on the descent of the piston, when the engine supplies no air, the return of the water into the receiver continues the blast until the cylinder resumes its office. The superficial area of the receiver must be very great so that the introduction of a cylinder of air will not cause such a descent of the water, as to be sensible, in the difference of pressure by the surrounding water. The internal dimensions of the receiver before us are 30 feet long, eight feet broad, and 10 feet deep. It is formed of cast iron plates screwed together, and loaded with an immense weight of masonry to keep it down steadily in its place. The external cistern is built of masonry or brickwork lined in such a manner as to avoid all danger of the escape of the water.

Plate 90, will explain the internal construction of the furnace. The mass of stone work AA called the stack, is lined with two thicknesses BB of brick or stone, which will withstand the continued action of an intense heat; between the two is a layer of sand represented by the dark lines in the figures. The cone BB is termed the funnel of the furnace, its base abuts upon an inverted frustum, DD more obtuse called the boshes. Beneath this the diameter of the funnel is much diminished, being brought to a square figure; and it is at this part G called the hearth, where the blast is introduced by the two pipes *k k*. The lower part of the stack is perforated on three sides with arches; the two which are opposite are called tuire arches (from *tuyau*, pipe) EE in the section 2. Their use is to expose the masonry of the hearth that the tuires (i. e. the appertures through which the blow pipes are entered) may be accessible. The other arch F section 1, is called the tymp arch from its leading to the tymp stone *a*, forming one side of the hearth, from the top, to within about 18 inches of the floor, it is made moveable that it may be easily renewed when burnt; and to preserve it, if it should split by the intense heat, an iron plate 6 and figure 4 is placed behind it having an angle below to sustain the stone. Both are fastened into their places by wedging against the side walls of the hearth: the opening below the tymp is stopped by the dam stone *d* set up upon the floor of the hearth, at about 20 inches distance from the tymp.

The ends of the pipes *k k*, coming from the regulator, are connected with the blow pipes *m*, by very strong leathern tubes *l*, which are joined to the pipes by hoops *n*, adjustable by screws, so as to hold the leather tight round them. By means of these leathern pipes the blow pipe *m* can be directed to blow into the furnace, in any direction within the limits of the tuires, or aperture to receive the pipes which are made through the stone work and lined with fire clay: the two small circles in the hearth of section 1, shews the position of the two tuires and that they do not blow opposite each other.

The constructions of blast furnaces are as various as their dimensions. Our plate 90 represents that kind which is in most universal use in Derbyshire. A great number of new furnaces have been erected which possess evident advantages, but yet require the sanction of all-powerful custom to render their introduction general. Considerable allowance is on this score to be made to manufacturers on account of the heavy loss which would be sustained by the unsuccessful experiment of a new constructed furnace, and the comparative small advantage to be obtained from its perfect success.

The internal figure of a blast furnace has great influence upon its operation, requiring to be varied, according to the nature of the fuel and ore it is to be charged with. The furnace is not merely to be considered as a hearth for the fusion of the matters introduced into it, but as an extensive laboratory for separating the metal from its earthy mixtures. When first introduced the ore becomes gradually heated. As it descends in the furnace by the consumption of the fuel beneath, it is roasted and by contact of carbon supplied by the fuel parts with its oxygen. This operation requires to be continued from 24 to 36 hours, more or less, as the ore employed is disposed to part with its oxygen. It is evident that the time any quantity of ore takes in passing down through the furnace, will be regulated by the proportions of its height and internal diameter. In a low and proportionally large furnace the materials will speedily arrive at the

hearth, being little retarded by friction against the sides of the funnel, and having less space to pass through. Such was the form of the old charcoal furnaces, which required less time from the greater quantity of carbon in the furnace. The deficiency of carbon in pit coal must be compensated by an additional period of cementation in the furnace. The descent of the materials is retarded by diminishing the diameter and increasing the height. In the same manner the furnaces burning soft cokes require narrower furnaces, than for hard cokes which have a similar quality as to their carbonic contents. This is necessary that the cokes may be more fitted to sustain the weight of water above them without being crushed: for hard cokes, but which are inferior in their carbon, a high furnace is adapted to produce a long continued cementation.

Similar reasons apply to the different qualities of ore as well as coal: some requiring to be longer in passing through the furnace than others in proportion as they are disposed to part with their oxygen: these various combinations render the proportions of the internal figure of an iron furnace so uncertain that no particular size can be mentioned as general. The furnace in the plate is 40 feet in height from the bottom of the hearth to the top; while others we have seen are as much as 60 feet. Many furnaces have the side of the funnel BB curved instead of straight, with a view to obviate any danger of the materials sticking in the furnace; which would have bad effects by rendering the operation of the furnace uncertain; owing to the sudden descents which must frequently occur by introducing improperly cemented ore into the furnace.

The intense heat raised in the furnace generally destroys the lining in about a year; though some will last three years, and others not six months; according to the quality of the lining. When this happens the furnace is burnt out, the stone work of the hearth and lining BB is removed and new put in without deranging the masonry of the stack; the dam stone in consequence of having the fluid metal constantly pended up against it, seldom lasts more than three months, and must be renewed without extinguishing the furnace; during the operation sand is rammed in under the tymp stone to keep in the heat, and the blast is stopped. The tymp is changed in the same manner when necessary. The casting house BB is provided with a crane to raise large work: its floor should be many feet deep, with casting sand; and it should contain a reverberating furnace, cupola and all the apparatus described in our article Foundry for casting the iron in its various articles.

An immense mound of earth is raised up, to form an inclined plane from the ground to the top of the furnace, on which the fuel and materials are conveyed to the top of the furnace. The scite of a blast furnace is mostly upon the declivity of a hill, for the greater convenience of constructing the inclined plane. In many cases where the inclination of the hill is considerable it is practicable to make the top of the furnace level with the coke yard where the fuel and ore, are prepared for it. In this case the steam engine, house, and its boiler-house, are carried up as high as the furnace, and the bridge loft or road to the top of the furnace is constructed over the top of the building. This arrangement saves a very considerable expense in the formation of the mound. At other works not possessing such advantages of ground, machinery is constructed to supersede manual labour altogether, in charging the furnace. In the elevation, Pl. 89. the dotted line KK represents the inclined plane of the furnace, and the line LL is the original level of the ground, where the works are constructed: these lines are represented as at right angles to their true position, which is shewn by KK in the plan, when they would be hidden behind the furnace in the elevation.

Operation of the Blast Furnace.

The furnace is lighted by introducing wood at the top, then a few cokes, the tuires are stopped up, and the dam stone left out to cause a draft, which is of course very great in a tall furnace. The wood is then lighted and is suffered to burn a fortnight, a few cokes being introduced once every day until the furnace becomes heated and gradually filled. The charging of the furnace now commences with four baskets equal to eight bushels of cokes, 12 stone of 14lb. each of ore; and four of limestone for a flux; the dam stones are put in and eight or nine days afterwards, during which interval 60 or 70 charges are introduced, the tuires are opened and the blast commenced, at first gently with a small nose pipe, and afterwards with a larger, until the furnace acquires the proper heat. These precautions are necessary to preserve the masonry of the furnace from cracking; which would otherwise happen by the unequal expansion of so large a mass, if the heat were urged too rapidly.

Twelve hours after the blast begins iron can be obtained from the furnace; and in the course of as many days if the business is well conducted, the furnace arrives at its proper heat and state for working constantly, as long as the lining lasts. The regular routine now takes place, charging every half hour with eight bushels of coke mixed with ore and limestone in different proportions according to the quality of the iron to be produced.

The ore and limestone when put into the furnace gradually descends as the matter below is consumed, becoming heated, and the carbon which abounds in the furnace enters into combination with the oxygen of the ore, and both pass off in the state of carbonic acid gas. A new combination now takes place between the carbon and the metal thus deprived of the oxygen; the carbonization proceeds more rapidly as the ore continues to descend and the heat increases. This process is continued until it arrives about the top of the cokes, where the heat becomes so intense, as to fuse both the iron and any of the impurities it contains: they now drop down in a fluid state, and accumulate in the bottom of the hearth, being kept in by the dam stone *a* from flowing out into the casting-house: while the matter remains here, the iron by its superior weight sinks to the bottom; the other melted matters form a liquid lava floating upon it, and rising up as the quantity increases, until it becomes high enough to flow over the dam stone upon the sand of the casting-house. The metal also accumulates, and in twelve hours after the commencement, is ready for casting. The dam stone is not made long enough to fill entirely the space in which it is placed, but about three inches space is left between one end of it and the side walls of the hearth: this aperture is stopped with sand, which is removed when the metal is to be cast, and suffered to

flow out into the moulds or pig beds formed in the casting-house BB.

The blast continues constantly night and day, except a cessation of about 20 minutes, every 12 hours while the metal is cast; otherwise as soon as the tap hole was opened a stream of flame would issue out many feet and greatly annoy the workmen: besides that, in furnaces burning the soft sorts of coal the blast is necessary when the tap hole is open to blow out the dust which accumulates and choaks up the tuires. After all the metal is let out the slag or lava follows, and if any remains it is drawn out by a hook: the furnace is now poked and stirred up with long bars called rangers, introduced over the dam stone, and under the tymp to loosen any slag which might have been held up among the cokes by the great pressure of the blast. The tap hole is next stopped up with sand, and also the space under the tymp and between the dam stone. The engine is now put in motion and the operation of the furnace resumed, the metal and slag soon dropping down into the hearth: in a short time the slag rises high enough to run over the dam stone, the sand before it being removed. The engraving shews that the bottom of the tymp is somewhat lower than the top of the dam stone, so that the slag touches the tymp iron, and prevents the blast or fire getting through at the same time that the slag runs off freely. The nose pipes are but very little above the level of the dam stone; and it is essential that the metal should be covered over with slag to defend it from the rapid oxygenation or burning which would take place by the stream of cold air striking upon the hot metal: from this circumstance it would appear that the blast is prejudicial; and so, in fact, it may be in some degree, by partially oxydizing the metal, while it remains in the hearth. Its use consists in augmenting the heat: for the affinity between the iron and the carbon is at first, insensible and increases in proportion to the temperature in which they are placed: the heat is, therefore, necessary on two accounts; first, to create a sufficient affinity between the iron and the carbon; and next, to melt down whatever is mixed with the ore.

The varieties of Slag.

The mixtures of the iron ore are by the operation of the furnace separated from the iron, and formed into a vitrified mass called slag, which is very brittle and hard. Its colour and appearance are very various, but affording a criterion of the state of the furnace by which the manager can form his judgment. The slag is composed principally of lime, silex, and clay melted together: it is most probable, that if it is coloured, it still contains a portion of iron, which ought to have been separated from it in the furnace. This is shewn by the slag produced before the furnace acquires the proper heat, being nearly black; and from its weight evidently containing a large portion of iron. Also, without a due proportion of lime, the slag breaks with a smooth fracture like bottle glass, and coloured black or dark blue: when melted, it runs freely, like water, holding the iron in solution. The iron produced at the same time is of the worst quality. On augmenting the quantity of lime, the slag becomes streaked with variegated colours, disposed in the most ...utiful curved stripes, and mixed with much ...te. It still preserves its polish on breaking. ... slag runs from the furnace in a more consistent state than the former, similar indeed to cream. Each streak contains less metal as its colour becomes lighter; and the white contains the least, if any. An additional proportion of lime produces a white slag which, when broken, presents an uneven surface and without polish, very similar to the fracture of porcelain. Such slag retains but very little iron in solution, and is that which the manager endeavours to procure: it is more tenacious than any of the former. Any farther quantity of lime beyond the curdled white slag, renders the slag so clotted, that it is liable to cement the cakes together, and choak up the furnace: it also retains an immense number of small globules of good iron, which have not sufficient weight to make their escape from the slag, though it contains scarcely any metal in solution.

The different qualities of Crude Iron.

The different qualities of crude iron thus produced from the blast furnace, are denoted by manufacturers, No. 1, 2, 3, and 4, according to their value; which being regulated by the demand for any particular quality, is no certain criterion of the absolute quality or composition of the metal; the number being differently applied in remote places, according to the local demands of the country. The notation following is that used at some Derbyshire furnaces, which our draughtsman visited, and from which the drawings were taken.

No. 1. also called *grey melting pig*, is the best iron; it contains a large proportion of carbon, and but little, if any, oxygen. The carbon is in such excess, that when cast, its surface is found covered with carburet of iron (black lead), termed by manufacturers *kish*. It melts easily, is soft so as to yield to the file, and less brittle than any other crude iron: when broken, it is of a grey colour. To make such iron, some of the furnaces in Derbyshire are charged with eight bushels of coke, 18 stone of ore, and eight of limestone; a less quantity of ore to the same fuel will improve its quality, when it can be afforded; but will hardly produce so great a proportion of metal. It must be understood, that this is the average charge. The state of the air having great influence on the products of the iron, in summer only, 16 stones of ore, eight of limestone, and in winter, 20 stones of ore, with the eight bushels of coke, will produce the same quality of iron.

No. 1. is used for mixing with inferior qualities to make fine castings for machinery, and where the iron is, requires to be filed and drilled.

No. 2. or *Forge pig*, is used to make malleable iron. It contains less carbon than No. 1. and is not perfectly deprived of its oxygen. Its fracture is of a lighter colour than No. 1.: it requires more heat to melt it, is harder, and more brittle. The average charge of the furnace for this kind is, 22 stones of ore, eight of limestone, to the eight bushels of coke.

No. 3. ***Foundry metal***, is less carbonated, harder, more infusible and brittle than the last, and contains more oxygen. It is employed to cast grate bars, weights, and all common articles. It is also used to mix with No. 1. for the use of the foundry. This metal is often accidentally produced from nearly the same charge as the last, when bad cokes, or imperfectly roasted ore, are used; or on any sudden change of the air. The furnace always making the best metal in proportion to the fuel, in the coldest weather, under the

same circumstances as the last, the charge would be 24, 25, or 26 stones of ore.

No. 4. *Ballast iron*, or *white hard iron*, being white like silver when broken, contains very little carbon, and much oxygen. It is harder than steel, and exceedingly brittle; so much so, indeed, as to be of little use but for ships ballast, and to mix with a large proportion of No. 1. for the foundry. It makes good axletree boxes for wheels; as, from its hardiness, it is not liable to fuse by friction. It requires so great a heat to melt it, that at the ordinary state of the furnace, it will scarcely run into the moulds.

This information respecting the charges, however, can only be considered as local, and varying considerably at the next furnace, though only a few miles distant, owing to the different qualities of the coal and ore. The rules which the practical managers observe are, that the best iron will be produced when the largest proportion of coke is used with the ore, and about one-third of its weight of limestone: a larger quantity of the latter makes the slag lumpy, and choaks the furnace; and with a smaller, it still retains a portion of iron in solution, whence arises its black colour, though the proportion of lime necessary is very uncertain, as it depends upon the fusibility of the extraneous mixtures of the ore.

The object of a manager is, therefore, to make the best and most iron with the least coals; or, what is the same (as the furnace is always supplied with the same quantity of fuel), to make it *bear the greatest burden of mine*, that is, the greatest quantity of ore, without debasing the quality, or lessening the quantity of the iron below the required produce. The quantity and velocity of the blast or air thrown into a furnace, has great influence on the products of it; and, from the combination of so many circumstances, no accurate rule of proportion can be laid down; even at the same furnace, the charge is continually varied to meet the existing circumstances.

An excellent division of the varieties of crude iron, by Mr. Mushet, will be found in the 2d vol. of the Phil. Mag. where he distinguishes four kinds from their component parts, instead of the uncertain distinction of price; a new division, which it is much to be wished was more generally adopted by manufacturers:

1st. *Oxygenated crude iron*, shewing by its name that oxygen is predominant, and the carbon in small quantity; this is the No. 4. white iron above, but in Scotland it is used for the forge.

2d. *Carbo-oxygenated crude iron*, containing equal proportions of carbon and oxygen, which seems the same as the foundry metal above.

3d. *Carbonated crude iron*, where the carbon predominates; it seems the same as No. 2. forge metal above, but in Scotland is termed *good melting pig iron*.

4th. *Super carbonated crude iron*, contains an excess of carbon, and little oxygen; this is No. 1. Kishy iron; its surface covered with plumbago.

A blast furnace of the dimensions given in the drawings, though by no means the largest sort, is charged 48 times with eight bushels of coke each time, in the course of a day and night; to produce this quantity of cokes, requires near 764 bushels of coals per day; it also consumes about nine tons of ore and limestone in the same time.

This furnace produces 25 tons of metal per week in summer, and 30 in winter, when making No. 1. metal: with No. 2. it will make from 35 to 40 tons per week.

At many iron works, three furnaces and their foundries are constantly in use; the coal and iron mines, together with forges and rolling mills for making the iron into bars, belonging to the same concern; the great number of steam engines, mills, waggons, horses, workmen's tools, frequently a railway or canal, from one part of the works to another, a large farm to maintain the horses, and the capital necessary to carry on such works, will give some idea of the opulence and general knowledge necessary for an iron master, to conduct his business with advantage to the community, and profit to himself.

The Manufacture of Malleable Iron.

Malleable iron should be pure iron without any mixture. No method has yet been practised in England of making pure iron from the ore at one operation; it must first pass through the state of crude or carbonated iron, and the carbon is afterwards expelled, leaving pure iron: the manipulations of this process are much more simple than the principles of mutual affinity upon which they operate.

The works for making malleable iron are termed *forges*; they contain, 1st. *fineries*, or furnaces and their blowing machines; 2d. the *forge stamping hammer*; 3d. *balling furnace*; 4th. *chaferies*, or second furnaces; and 5th. the *forge drawing hammer* for forming the iron into bars. In the vicinity of a large forge, a rolling mill is usually erected; and, though not essential, it is a very useful addition for slitting and finishing the bars neatly. In small works, the same mill is used both as a stamping and drawing hammer, and all the machinery is contained in one building. A plan and elevation of such a work is given in plate 91, where A A A are the fineries or forges in which the iron is deprived of its carbon; B the water wheel for the blowing engine; D the wheel for working the hammer; X the balling furnace; E the chafery or second forge for heating the iron to be made into bars.

The Blowing Machine.

The engine acts by two single acting cylinders FF (See our article Blowing Engine), moved by means of wheels *a a*, called camms, fixed on the axis of the water wheel B. They are in the figure of a heart, and hence are sometimes called heart wheels. The ends of the piston rods *b b* of the cylinders FF, have small wheels in the lower end of them, resting upon the circumference of the camms *a a*; and they are guided in a truly vertical motion, by wheels *t t* on each side of them.

The revolution of the water wheel by the excentricity of the camms alternately lift up the pistons of the cylinders, blowing the air through the pipes *f f* to the furnaces. The pistons descend again by their own weight, but much quicker than they ascend, which is effected by the different curvatures of the camms; the cylinders act in the same manner as the blowing engine, under that article.

The Finery.

The air from either cylinder is conducted by cast iron pipes *f f f*, supported in the roof from the blowing engine to the chafery E, and the fineries A A; one of which is represented on a larger scale in fig. 2. plate 92. where *f* represents a part of the same air pipe, provided with a cock *g*, to intercept and regulate the stream of air; and the lower end of it is connected by a

leathern tube *h*, with a nose pipe *i*, which turns horizontally into the tuire of the furnace, which is exceedingly simple, being only a dome G, and chimney H of brickwork, and beneath a square hole *k*, called the hearth, to contain the fuel. The hearth is lined with cast iron plates, and the lower one left hollow beneath to keep it cool, by throwing water under, and preserve it from melting. The plate against the back wall is raised much higher than the others, to receive the tire iron fig. 3. which is a wrought iron tube projecting a small distance into the fire, to contain the nozel *i* of the air-pipe. This tire iron being exposed to a great heat, would be rapidly burnt away, without some contrivance which will keep it cool. The conical tire iron is, in fact, formed of two tubes, one within another, leaving a small cavity between them to receive a thin sheet of cold water which is conveyed in a trough to a pipe *m*, communicating with the cavity: *n* is another similar pipe to take away the water, but bent down, so that its orifice is lower than the former, which is turned up to receive the stream of cold water, while the lower pipe conveys it away when warm into a cistern *o*, fig. 2. The stream of cold water is supplied by four small buckets upon the circumference of the water wheel B, which are filled when at the lowest part of their motion, and discharge their contents when at the highest, into a cistern which communicates the water by means of a trough and pipes to the tire irons.

The only difference between the finery and chafery, is in the latter being somewhat larger, and standing higher from the ground, and to be described shortly.

The Forge Hammer.

The water wheel D (plates 91, 92.) of the hammer mill, has on its axis K a large wheel *p*, furnished with four cogs, which in succession lift up the hammer L; it moves on an axis *q*, supported by two uprights *s s* of cast iron, which are in the same piece, and cast at the same time with a large iron plate, acting as a floor for a third, upright iron T extending from the ground to a large beam D called the drome, which is also supported at one end by a beam across the house, and at the end towards the water wheel, by a large vertical post *w*; *v* is a strong ash spring, supported by passing through the upright W T, and extending over the hammer L By the motion of the water wheel, the cogs of the wheel *p* throw the hammer forcibly up against the spring *v*; by this it is reflected down upon the anvil with an additional power, from the weight of the hammer, which for stamping never weighs less than six cwt. and very often much more. The anvil *z* is made of cast iron, bedded in a large block of stone or wood, and care must be taken that no conduit or arch is made near the anvil block, or the bearings of the gudgeon of the cog wheel *p*, because all the power required to lift up the hammer is first exerted upon the gudgeon of the wheel. The ground, therefore, should be made as solid as possible, or the reiterated blows of so heavy a mass will shake all the foundation of the building. The large anvil block is perforated with a square hole to receive a small anvil face, which can be changed for another of different figure at pleasure, without disturbing the anvil block. The hammer handle is made of sound oak, and is well hooped with iron, to fortify it against the violent shocks it is constantly receiving from the cogs of the wheel *p*. The hammer is easily changed by taking its axis out of the bearings, to put in another of different weight or figure, and, as the head is only wedged on to the handle, it can be taken off when the handle is shaken to pieces, which often happens in two or three months wear. A violent action is constantly exerted upon the spring *v*, which tends to throw up all the framing. To resist this, a weight of six tons of cast iron is placed on the drome at Y, but is insufficient to prevent a considerable vibration, which soon destroys the wood framing.

The Process of Converting Iron.

The operation of the fineries is as follows, 3 cwt. of crude iron of the number 2 or forge metal is put into the hearth, which is previously filled up with burning charcoal. The metal is covered up with the fuel, and the blast commenced. It quickly melts down into the bottom of the hearth; and in about 20 minutes the workman opens a tap hole called the cinder hole, which is rather above the level the surface of the metal is supposed to occupy in the hearth. A small quantity of liquid lava called finery cinder flows out at this aperture; and if any of the metal comes out at the same time, the workman throws water upon it, and returns it to the furnace again. When the bottom plate 92 of the finery hearth is very hot, it often happens that as much as 2 cwt. of the metal will flow out in this manner, which must be returned to the furnace. But in general the principal part which runs out, is cinder only; as this becomes separated from the melted iron it gradually thickens, and becomes more infusible. All this time the workman is employed continually, poking, and stirring the metal, that every portion may be equally submitted to the action of the fire; and to prevent the iron from adhering to the sides of the finery, or the tire iron, he searches all round such places with his tool and removes any metal he finds. In about half an hour's time or three-quarter's at farthest, the cinder hole is stopped up with dust, to keep in the remaining cinder, which is found conducive to the conversion of the iron. The sparks which have hitherto arisen from the fire are of a bright red colour; but about this time they change to a white colour: it is by this appearance, the workman is guided in stopping up the tap hole. To retain the cinder also by the adhesion of the metal to the iron bar used to stir the furnace, which is less now than at the commencement of the process, when a hammer N was necessary to knock off the adherent metal. These signs indicate that some of the metal is beginning to change into malleable iron. At this time the cock in the air pipe is further opened to increase the quantity of the blast, and the metal is suffered to remain enveloped in the cinder without much disturbance until about 75 minutes after the commencement, by which time the whole of the metal is become so far malleable that it will no longer melt in the heat of the finery; but lies in large lumps at the bottom. The workman now divides the lumps, and by his poker endeavours to expose new surfaces to the action of the fire, and turns the whole mass over. It now remains until two hours and a quarter after the first, when it is generally found completely converted into malleable iron, and is taken out of the fire by a hook P. It has now lost all metallic appearance, an indifferent observer scarcely distinguishing it from the surrounding charcoal. It is divided into the most minute particles, not larger than sand, but still adhering together: and this appearance commences as soon as the iron comes into *nature* as the workmen term it, that is, becomes malleable. The globules are at first of considerable size, but afterwards dividing into an almost infinite number

of small grains, which seem to repel each other by reason of their being so greatly divided that light may be seen through every part of a small piece. During the above process the workman frequently covers up the charcoal, and throws on water with the bowl R wherever the flames break out; both with a view to economise fuel, and to moderate the great heat thrown out; which together with the labour of stirring up so heavy a mass of metal, and the tremendous roaring of the blast renders the post excessively fatiguing to the workmen.

Immediately on taking a portion of the iron from the fire, the blast is diminished so much as only to keep the remaining iron in a welding heat; more than this would oxydate and burn away the remaining metal, without producing any good effect. The piece of iron is shoved along the floor with a fork S, to the hammer which is then put in motion by raising the water-wheel shuttle with the handle O, pl. 92. The first time the hammer is lifted up, the workman places the iron upon the anvil, and the hammer immediately falls with a tremendous blow upon it. The next cog of the wheel P throws the hammer up again in an instant; and by striking the spring it is thrown down with increased force. After two or three blows in this manner the water wheel acquires its full velocity, striking from 15 to 30 times per minute, according to the quantity of water running upon the wheel; during this time the workman continually turns the iron about, that every part may be hammered. The operation of the hammer while the iron is in a welding heat, welds and consolidates the divided particles of metal into a solid mass, which however is not free from flaws, particularly the edges, being cracked very much. The cakes which are thus produced are termed stampings. The great percussion of the hammer forces out the remaining slag, or melted cinder, from the iron by mechanical pressure. When the iron is under the hammer, a stream of liquid fire is frequently projected out of the cavities, on the stroke of the hammer, with such force as to strike the roof of the building.

The operation of the finery is intended to expel the carbon from the crude iron, which it is supposed, by practical men, to effect by burning and consuming the carbon contained in the iron; but this does not sufficiently account for the absence of the oxygen which forge pigs always contain. It is more probably effected by the carbon and oxygen entering into combination and passing off in carbonic acid gas, an explanation which is confirmed by some experiments of Dr. Beddoes on an operation called Puddling, which is analogous to the finery.

Iron Bar *Manufacture*. The stampings obtained by the foregoing process are malleable iron; but in a state too divided to be fit for the smith, and must therefore be first manufactured into bars. If a rolling-mill is near the forge the stampings are carried thither, and, being heated, are passed two or three times through the rolls, to close up the flaws and render them compact. They are then whilst red hot clipped into pieces by the shears (See Rolling *Mill*) and taken back to the forges. Where no rolling mill is near, the stampings are broken while cold into pieces, and the fragments are sorted into various qualities, as they are more or less completely deprived of their impurities, and are piled up on circular stones or tiles, being intermixed with pieces of old iron called scraps. As many of these piles termed scraps-ball weighing half cwt. each are introduced into the balling furnace, as it will contain. This furnace is a reverberatory one, as described in the article Furnace, having a level floor to place the balls upon. Here a welding heat is given by the flame to the balls, which in this state are termed shingles; and they are taken out by a hook. At this temperature the fragments composing the pile adhere together strongly, and are carried all together to the hammer to be welded into a solid mass, and form them into bloom or slabs. For this purpose two workmen are employed, and assisted by the furnace-tender. When the metal is at the proper heat the latter carries the shingle to the hammer, the first hammer-man brings an iron bar, the end of which has been heated in the chafery, and the second man draws the water-wheel shuttle. At the first rising of the hammer the furnace-man lifts the shingle upon the anvil with a pair of tongs; the hammer-man places the end of his bar upon it, and the falling of the hammer welds all together. The bar now becomes a handle to direct the shingle under the hammer, the workman turning it over between each blow that it may be struck on different sides; this is continued as long as the heat is sufficiently great, by which time the workman will have formed the shingle into a large and short bar, termed a bloom, or half bloom, according to its weight. The furnace-man now brings another shingle, and the second hammer-man an iron bar which they place upon the anvil together, and at the same instant the first man takes his bloom to the chafery; so that the hammer never strikes upon the anvil. The first man then rests himself until his partner has finished; when he must resume his labour while the other rests. In this manner the operation proceeds until all the shingles contained in the furnace are made into blooms, and placed in the chafery fire. By this time those first introduced are sufficiently heated, for a second forging, which employs the hammer while the balling furnace is charging again: by the second forging the blooms are drawn out in the middle to a bar the true shape and size of the bar intended to be manufactured; the ends are at the same time left unformed, it is now termed an ancory, and at two more heats its ends are drawn out and it becomes a bar. Iron which is intended to be made into plate at the rolling mill, is forged from the scraps ball at two heats into a *slab* which is a parallel pipedon or piece of very thick plate its size according to what are intended to be rolled; the largest are about 18 inches by 12, and three inches in thickness. In the above operation the iron loses considerably in weight: 25 cwt of crude iron being allowed to make one ton of bar iron: a great part of this waste is sustained in the finery, the cinder of which is black and evidently contains a large proportion of metal; and in the subsequent operation of the hammer the forge scales or black oxyde which comes from the surface of the metal is very considerable. The workmen are allowed 52 baskets of charcoal to convert a ton of pig iron, each of which we estimate to contain about half a bushel or less. They observe that more fuel is required after a heavy fall of snow or rain.

In all large works two hammers and often three are used: the first is in the same building with the fineries to make stampings: the other (sometimes in a separate building which contains the chaferies, and balling furnace) is used to draw the stamping out into bars, and is therefore termed the drawing

hammer. The same mill also sometimes turns a pair of rollers. We thought it unnecessary to extend the number of our plates by giving the second forge; as it may be easily comprehended from those we have delineated.

The interior of an extensive forge presents a spectacle which perhaps approaches the nearest of any work of art, to the poetical description of Vulcan's Cave. Some of these buildings contain six of the fineries, which produce a most intense heat and light. The roaring of the blast is truly tremendous; added to the falling of the water on the wheels of two blowing machines, and two hammer mills, which strike alternately with such violence as to shake the earth for a considerable distance: the number of workmen busily employed in the midst of such confusion in carrying hot metal about, and the strong reflection of light and shade upon their faces produce a scene which would be an excellent subject for the painter.

Process of Puddling Iron.

A process termed *Puddling* has been lately invented, to make malleable iron from crude by an air reverberating furnace similar to that described in the article furnace; except that the floor is hollowed out into a bason in the middle opposite the door into the furnace, two and a half cwt. of crude iron is introduced into the bason and the flame of pit coal forcibly reverberated upon it. In half an hour after charging, it is melted; the attendant now shuts off the flame from the metal by opening another vent for the draught of the chimney; he stirs up and turns over the metal, and in 50 minutes it becomes collected into lumps about the size of gravel. As soon as the heat becomes so far diminished that the metal works with any difficulty, the flame is turned on again; which is usually about 55 minutes. In three minutes more it becomes soft and semi-fluid; and the flame is turned off. The hottest part of the mass now begins to heave and swell, emitting a lambent blue flame. An appearance called fermentation which becomes generally throughout the furnace in the course of an hour. It is a remarkable circumstance that in about 73 minutes the metal seems rather more heated than before the flame was turned off, though a quarter of an hour since it received any heat from the fire: in 78 minutes the blue flame and heaving partially ceases, and where this happens the mass is only of a dull red heat. All this time the metal adheres to the iron tool with which it is worked, or stirred up, and continually requires a sharp blow with a hammer upon the end of it to shake off the adherent metal. In about 80 minutes this property of the metal diminishes, and by the time it is lost the operation is judged compleat. In 83 minutes the fermentation and blue flame nearly cease; the metal becoming cool and stiff; the flame is then turned on and quickly off again. In 86 minutes the metal is become as fine as sand, the blue flame which again appears is of a lighter blue. At 90 minutes the metal is heated again for a short time; it ferments strongly and hisses, a noise which was heard from the first appearance of blue flame, but exceedingly faint till now. At 100 minutes less blue flame. In the succeeding eight minutes the metal is heated twice, by which time it is clotted and stands wherever it is placed without tendency to flow, and no liquid metal remains in the bason of the furnace. A little finery cylinder boils up in the metal at 110 minutes, and it is to this the workman attributes the hissing noise above mentioned. In 113 minutes the fermentation ceases, the metal is collected into lumps, the furnace shut up close, and a fierce flame applied to heat the metal sufficiently for the hammer or rollers.

This account of the puddling process is collected from an excellent paper by Dr. Beddoes in the Philosophical Transactions, and exactly corresponds with what we have observed. The Doctor afterwards details a set of interesting experiments to determine the nature of the gass which was evolved during the fermentations or blue flame; and which proved to contain carbonic acid gass, or carbon and oxygen volatilized by heat: whence he concludes that the carbon in the crude iron is not merely burnt away from it, but that it combines with the oxygen of the air, leaving malleable iron in the furnace. In the operation of the finery as well as the puddling furnace the manufactures consider the oxygen furnished by a draft or blast of atmospheric air to be necessary to combine with the carbon of iron; and in many places we have visited, water is thrown into the puddling furnace at several periods to furnish oxygen by its decomposition, a method which is found to be advantageous. Dr. Beddoes with much probability, suggests, that this air is pernicious from the great waste of metal it occasions; for every grain of carbon which is converted into gass by it, many of these irons are converted into black oxyde; and hence he remarks that great advantage would be derived from making such crude iron as would contain the proper portion of oxygen to combine with the carbon, without farther addition from the blast. In such case the operation might be performed in a close vessel, and by that means greatly diminish the loss of metal occasioned by oxydation.

At all the puddling furnaces we have visited the iron undergoes a fusion in a finery with coke, previous to the puddling. The finery has two tuires directed downwards so as to blow upon the metal, which is soon fused and afterwards let out into a mould or cast iron trough; before it cools it is broken into pieces and carried to the puddling furnace.

At some works the puddled iron is worked into bars in the same manner as above described; but by a modern invention it is manufactured without a forge hammer. The puddling balls when taken from the furnace are passed between a large pair of rollers which have a number of grooves of different sizes formed round them; these compress the iron and answer the purpose of the hammer. As soon as the metal comes through the rollers, a workman behind lifts it over the upper roll to the first workman who puts it between them again; in this manner the metal is rolled 10 or 12 times; at each time being put through a smaller groove of the rollers so as to compress it in a greater degree every time. After these operations the pieces thus rolled are piled up four together, and put into a ball furnace; and when heated they are rolled into bars by rolls similar to the former, but provided with grooves the proper size of the intended bars; in which state they are sent to market, or slit into nail-rods, &c. See Slitting *Mill*.

The advantage of the puddling process is in the dispatch with which the iron is converted and comparatively small expense of fuel; at present the puddled iron is not so good in quality as the finery; though this circumstance should not deter manufacturers from using it, as it is scarcely

possible that a newly invented process should be at first brought to equal perfection with another which has exercised the ingenuity of manufacturers for ages past. But in the course of practice many improvements will arise, which might have remained undiscovered if the process in its present state were neglected.

The rollers are thought to enclose the impurities in the iron rather than expel them; but as rollers require much less power to give them motion than the hammer, it becomes worth the consideration of manufacturers to improve their construction, and render them equal in effect to the hammer: even in the present state the puddled iron made with rollers is by no means to be despised when its price and quality are compared.

IRON Bridge. Iron being the most abundant, cheap, and generally useful of all the metals, has of late been applied in all works where great strength was required in proportion to the weight of the material: hence cylinders, beams, and pumps for steam engines, boats and barges for canals and navigable rivers, beams and pillars for large buildings, and at length *bridges*, have been constructed of iron.

The first iron bridge in point of time, is that over the river Severn, near Colnbrook Dale, in Shropshire. It consists of an arch of above 100 feet span, and rises 45 feet. There are five ribs, each cast in two pieces, secured where they join at the crown of the arch by a cast iron key-plate, and connected together horizontally and vertically by cast iron braces, formed with dovetails and forelocks: the ribs are covered with cast iron plates, and the railing to the sides is of iron. The total weight of iron is 378½ tons. This bridge was built by Mr. Abraham Darley, and the iron work was cast at Colnbrook Dale in the year 1779. It was a very bold effort: for in the first instance, in adopting a new material, the span of the centre arch at Blackfriars Bridge was exceeded; and that had always been considered as a great exertion with stone.

The second iron bridge was built over the same river, about two miles above the former one, at a place called Buildwas. It was erected at the expense of the county of Salop, agreeably to a plan, and under the direction of Mr. Thelford, surveyor of the public works of that county. It also was cast at Colnbrook Dale in 1795 and 1796. The arch is 130 feet in the Span, and rises from the springing to the soffit of the arch 27 feet. In this bridge, as it was necessary to keep the roadway as low as possible, the principle of the Schaffhausen and Wittingen bridges (see *Wooden* Bridge) is in some degree adopted: for the outside ribs are made to go up as high as the railing; they are connected with the ribs that bear the covering plates, by means of pieces of iron dovetailed in the form of king-posts. The plates which form the covering over the lower ribs are cast with deep flanches, are laid close to each other, and form an arch of themselves, so that altogether the bridge is compact and firm. The weight of iron is nearly 174 tons.

Some smaller bridges, and an aqueduct at Longden (the first made of iron for a navigable canal) have also been made, in Shropshire, under Mr. Thelford's direction.

The next bridge, on a large scale, which was made of iron, was that magnificent and elegant one over the river Wear, at Monk Wearmouth, near Sunderland. The projector and architect was *Rowland Burdon*, Esq. M. P. The arch is a segment of a circle, whose diameter is about 444 feet. The span of the arch is 236 feet, and its versed sine, or spring, is 34 feet. It springs at the elevation of 60 feet from the surface of the river at low water, so that vessels of 200, or perhaps 300 tons burden, may pass under it in the middle of the stream, or even 50 feet on each side of it, without lowering their top-masts. This bridge is rendered very considerably lighter than it could have been if made of stone, by means of the great voids which cast iron will permit, and the simplicity with which that metal may be reduced to any form. The blocks are so cast as to serve as arch-stones; and in the arch they butt on each other, in the same manner as the voussoirs of a stone arch. The thickness of the arms, of which a block was constituted, is no more than four inches: the longest dimension of a block is about three feet, and its weight about 4 cwt. These are kept in their places, and made to bear accurately upon each other by bars of wrought iron, which run along grooves on each side of the blocks, and are bolted through at equal distances to braces of cast iron, passing horizontally between the ribs; of six of which, placed at five feet distance from each other, the arch consists. One rib contains a series of about 125 blocks. This admirable structure is able to withstand an enormous pressure, so long as the abutments of the arch do not spring; and of this there is hardly any risk, because they are solid rock faced with about four or five yards of solid block masonry. It were desirable though that something were done to stiffen the arch at the sides, by the manner of filling up the spandrels, or space between the arch and the roadway. They are so filled up as to be extremely light and pleasing to the eye; namely, by large cast iron circles which touch the roadway and the extrados of the arch: the roadway rests upon them as on so many hoops, while they rest on the back of the arch, and also touch each other laterally. But this cannot contribute much to the strength of the arch; for these hoops will be easily compressed at the points of contact, and, changing their shape, will oppose very little resistance. This part of the arch might have been greatly strengthened, by connecting it with the roadway by trussed frames, in the same manner as a judicious carpenter would have framed a roof.

The arch contains only 260 tons of iron, of which about 55 are wrought iron. The superstructure is of wood planked over at top. This floor is covered with a coating of chalk and tar, on which are laid the materials for the carriage road, consisting of marle, limestone, and gravel; with footways of flag-stones at the sides. The weight of the whole does not exceed 1000 tons; whereas the lightest stone arch which could have been erected would have weighed 15,000. It was turned on a very light but stiff scaffolding, most judiciously constructed for the preservation of its form, and for allowing an uninterrupted passage for the numerous ships and small craft which frequent the busy harbour of Sunderland. The mode of framing the arch was so simple and easy that it was put up in ten days! without an accident; and when all was finished and the scaffolding removed, the arch did not sensibly change its form. This noble structure, undoubtedly superior to any thing of the kind existing in Europe, was finished in the autumn of 1796: it was

executed at the expense of about 25,000l. of which sum 19,000l. was advanced by Mr. Burdon,

We were sorry to learn very recently, that this bridge has shewn some symptoms of instability; the arch, estimating it according to a vertical section, having swerved nearly 18 inches from a correct plane. This is a source of danger which it does not seem easy to remedy completely.

An elegant iron bridge has been lately erected over the Thames, at Staines. The arch of this structure is the flattest ever built on so large a scale, being the segment of a circle of 2522 feet diameter; the chord, or span, 180; and the height, or reversed sine, 16 feet. It springs from abutments of stone built on piles, and is about 27 feet in breadth. It consists of six ribs placed five feet asunder, kept in their position by perforated cross bars placed horizontally at the top and bottom of each arch-piece quite across the bridge: each of the ribs is composed of 39 arch-pieces, four feet seven inches three-quarters long at top, and four feet six inches and three-eighths at bottom; four feet deep, and four inches one-quarter thick. They are cast hollow for the purpose of introducing dowels four inches and a half wide, and two inches thick. Through these dowels, and likewise the arch-pieces, are cast holes, into which wedges are driven, which bring the parts into close contact. The spandrels are filled up with circles which diminish from the abutments to the centre, after the manner of the Wearmouth arch: this part we do not approve. The whole is covered with plates one inch thick, and two feet broad, on the ends of which rest the pannels, on which is placed the bolustrade. The whole weight of iron is 270 tons, and of this the covering plates weigh 100 tons. The bridge was cast by the Walkers of Rotheram, on an improved plan invented by Mr. T. Wilson, the ingenious engineer of the Wearmouth Bridge, who has taken out a patent for this invention.—The whole iron-work was thrown across in less than six months, and the bridge was opened for public use on Saturday, Sept. 3, 1803. The king and royal family passed over the bridge in the first four coaches that crossed it.

We have been the more particular in our account of iron bridges, and especially the one at Wearmouth, because of their connection with the proposed plan of erecting an iron bridge across the Thames in lieu of London Bridge. The select committee of the House of Commons, upon the improvement of the port of London, conceived it "essential to the improvement and accommodation of that port, that London Bridge should be rebuilt on such a construction as to permit a free passage, at all times of the tide, for ships of such a tonnage at least as the depth of the river would admit at present between London Bridge and Blackfriars Bridge:" and, "That an iron bridge. having its centre arch not less than 65 feet high in the clear above high-water mark, will answer the intended purposes, with the greatest convenience, and at the least expense." After the third report of this committhe was framed, they received among other plans and designs, one from Messrs. Thelford and Douglass, recommending an iron bridge of a single arch, of the height pointed out in their resolutions, and no less than 600 feet in the span, being the width to which, by Mr. Jessop's report, the river ought to be contracted.

According to this plan the length of the arch of the bridge will be about 618½ feet, being 48° 54′ of a circle whose diameter is 1449 8-13ths feet: the width of the bridge at the crown will be 45 or 50 feet, and increasing gradually in width to the abutments, which will be 90 or 100 feet wide. The bridge is to be composed wholly of cast iron, which is much less liable to decay or alteration than wrought iron; the ribs are to be cast in portions of as large a size as can be conveniently moulded and cast correctly, and such as can be readily managed in the removing and putting up; they are to be connected together by cross and diagonal ties and braces, placed in such a manner that any of the ribs, or ties, or braces, may be taken out separately and replaced without injury or interruption to the bridge. The ribs are to receive the weight and pressure in such a direction that the stress will operate upon the pieces of iron endways; therefore, before the bridge can give way, the iron must be crushed to pieces. All the frames, or ribs, are to be connected vertically and horizontally, from the soffit of the arch to the roadway; so that, in great measure, the whole bridge will act as one frame, and by that means lessen the lateral pressure against the abutments, and provide against any small error in the equilibration of the arch. The ribs are to be so disposed as to spread from the middle of the bridge to the abutments; and thus they may, by embracing a greater space on the shore, accommodate the road-way in turning at the end of the bridge, and at the same time prevent any tendency the bridge might have to side vibrations; the side vibrations will also be further opposed by the cross and diagonal ties and braces, and by a plate of grating which is to be laid across the ribs to receive the road-way. This road-way is to be composed first of a light, dry, and durable substance laid next to the iron plates; secondly, of a compact substance, which will not admit of water passing through it; and thirdly, of the side paths and pavements for the driving-way. The whole external form of the bridge is to be composed of gothic tracery; the railing is also to be of gothic work, with gothic pinnacles to receive the lamps; so that the bright will, at a distance, have the appearance of a frame of light gothic tracery, finished on the top with that wildness of outline of which the gothic stile is so capable. The estimate which accompanies this plan, lays the whole expense of the bridge at about 262,289l.

The obvious advantages which would be obtained if the communication could be effected by means of a single arch, as well as the magnificence of the proposed structure, appeared to give this design a particular claim to the notice of the committee; yet the attempt was of so novel a nature, that they thought it absolutely necessary for their own information, as well as for the purpose of affording some grounds upon which the House of Commons might form their judgment as to the expediency of the measure, to request the opinions of some of the persons most eminent in Great Britain for their theoretic as well as practical knowledge of such subjects. For this purpose they drew up a series of twenty-one very judicious and apposite queries, and transmitted, together with the engraved design of Messrs. Thelford and Douglass, and the explanatory drawings, to such persons as were thought most capable of affording them information. To these queries they received answers from Dr.

Maskelyne, Mr. A. Robertson, Mr. Playfair, Dr. Robison, Dr. Milner, Dr. Hutton, Mr. Atwood, Colonel Twiss, Mr. Jessop, Mr. Rennie, Mr. Watt, Mr. Southern, Mr. Reynolds, Mr. Wilkinson, and Mr. Bage. Some of these gentlemen suggested particular improvements and modifications of the plan: but considering all the circumstances of the case, it was nearly their unanimous opinion, that a cast iron arch of 600 feet in the span was practicable and adviseable, and capable of being rendered a beautiful, useful, and durable edifice.

The report of the committee, which contains the answers of the above-named gentlemen to the queries proposed, was ordered to be printed on the 3d of June, 1801: it is almost needless to add, that it comprises a great deal of scientific and valuable information, on the subject of bridges in general.

At the time the preceding account was drawn up (viz. 1804) there seemed much probability that the iron bridge would be erected: we have now (April, 1810) only to add, that the project seems to be altogether abandoned.

Much information on the subject of Iron Bridges will be given in the collection of Dr. Hutton's Works, now publishing.

Iron denotes—1. any instrument or utensil made of iron; as, a flat *iron*, or smoothing *iron* (*Pope*). 2. Chain; shackle; manacle (*Psalms*).

I'RON. *a.* 1. Made of iron (*Mortimer*). 2. resembling iron in colour (*Woodward*). 3. Harsh; severe; rigid; miserable (*Crushaw*). 4. Indissoluble; unbroken (*Philips*). 5. Hard; impenetrable (*Shakspeare*).

To I'RON. *v. a* (from the noun.) 1. To smooth with an iron. 2. To shackle with irons.

Iron *Moulds*, and spots of ink in linen may be taken out by moistening the stained part in a solution of oxalic acid in distilled water, and then washing it out with pure water.

Iron *Ochre*. In mineralogy. See Ferrum.

Iron *Pyrites*, in mineralogy. See Ferrum.

Iron *Wood*, in botany. See Sideroxylum and Fagara.

Iron *Wort*, in botany. See Siderites.

IRO'NICAL. *a.* (from *irony.*) Expressing one thing and meaning another; speaking by contraries (*Brown*).

IRO'NICALLY. *ad.* (from *ironical.*) By the use of irony (*Bacon*).

IRONMO'NGER. *s.* (*iron* and *monger.*) A dealer in iron.

I'RONWOOD. *s.* A kind of wood extremely hard, and so ponderous as to sink in water.

I'RONY. *a.* (from *iron.*) Made of iron; partaking of iron (*Hammond*).

I'RONY. *s.* (*ironie*, French.) A mode of speech in which the meaning is contrary to the words (*Swift*).

IROQUOIS, the name of five nations in North America, in alliance with the British Colonies. They are bounded by Canada on the north, by the British plantations of New York, and by Pennsylvania on the east and south, and by Lake Ontario on the west.

IRRA'DIANCE. } IRRA'DIANCY. } *s.* (*irradiance*, French.) 1. Emission of rays or beams of light upon any object (*Brown*). 2. Beams of light emitted (*Milton*).

To IRRA'DIATE. *v. a.* (*irradio*, Latin.) 1. To adorn with light emitted upon it; to brighten (*South*). 2. To enlighten intellectually; to illumine; to illuminate (*Milton*). 3. To animate by heat or light (*Hale*). 4. To decorate with shining ornaments (*Pope*).

IRRADIA'TION. *s.* (*irradiation*, French.) 1. The act of emitting beams of light (*Digby*). 2. Illumination; intellectual light.

IRRA'TIONAL. *a.* (*irrationalis*, Latin.) 1. Void of reason; void of understanding; wanting the discoursive faculty (*Milton*). 2. Absurd; contrary to reason (*Harvey*).

Irra'tional Numbers or Quantities, are such roots as cannot be accurately extracted, being incommensurable to unity. See Surds.

IRRATIONA'LITY. *s.* (from *irrational.*) Want of reason.

IRRA'TIONALLY. *ad.* (from *irrational.*) Without reason; absurdly.

IRRECLA'IMABLE. *a.* (*in* and *reclaimable.*) Not to be reclaimed; not to be changed to the better (*Addison*).

IRRECONCI'LEABLE. *a.* (*irreconcileable*, Fr.) 1. Not to be recalled to kindness; not to be appeased (*Dryden*). 2. Not to be made consistent (*Rogers*).

IRRECONCI'LEABLENESS. *s.* (from *irreconcileable.*) Impossibility to be reconciled.

IRRECONCI'LEABLY. *ad.* (from *irreconcileable.*) In a manner not admitting reconciliation.

IRRECONCI'LED. *a.* (*in* and *reconciled.*) Not atoned (*Shakspeare*).

IRRECO'VERABLE. *a.* (*in* and *recoverable.*) 1. Not to be regained; not to be restored or repaired (*Rogers*). 2. Not to be remedied (*Hooker*).

IRRECO'VERABLY. *ad.* (from *irrecoverable.*) Beyond recovery; past repair (*Milton*).

IRREDU'CIBLE. *a.* (*in* and *reducible.*) Not to be brought or reduced (*Boyle*).

Irredu'cible Case, in algebra, that case of cubic equations where the root, according to Cardan's rule, appears under an impossible or imaginary form, and yet is real. The general form being $x^3 - ax = \pm b$, where $\frac{1}{27}a^3$ is greater than $\frac{1}{4}b^2$, or $4a^3$ greater than $27b^2$. Thus, in the equation $x^3 - 90x - 100 = 0$, the root, according to Cardan's rule will be $x = \sqrt[3]{50 + \sqrt{-24500}} + \sqrt[3]{50 - \sqrt{-24500}}$, which is an impossible expression, and yet one root is equal to 10; and the other two roots of the equation are also real. Algebraists, for two centuries, have in vain endeavoured to resolve this case, and bring it under a real form; and the question is not less famous among them, than the squaring of the circle is among geometers.

One of the most convenient methods of determining the roots of equations of this

kind, is by means of a Table of Natural Sines, &c. for which purpose the following formulæ will be found extremely commodious, the arc, in each case, being always less than a quadrant, and therefore attended with no ambiguity.

If the equation be $x^3-ax=b$; let A be put = arc whose cos. is $\frac{3b}{2a}\sqrt{\frac{3}{a}}$ to rad. 1, then the three roots, or values of x, will be as follows:

$$x = 2\sqrt{\frac{a}{3}} \times \text{cosine}\frac{A}{3}$$

$$x = -2\sqrt{\frac{a}{3}} \times \text{sine}\frac{90°+A}{3}$$

$$x = -2\sqrt{\frac{a}{3}} \times \text{sine}\frac{90°-A}{3}$$

And, if the equation be $x^3-ax=-b$; let A be put = arc whose sine is $\frac{3b}{2a}\sqrt{\frac{3}{a}}$ to rad. 1; then the three roots, or values of x, will be as follows:

$$x = 2\sqrt{\frac{a}{3}} \times \text{sine}\frac{A}{3}$$

$$x = 2\sqrt{\frac{a}{3}} \times \text{cos.}\,\frac{90°+A}{3}$$

$$x = -2\sqrt{\frac{a}{3}} \times \text{cos.}\,\frac{90°+A}{3}$$

Ex. Let $x^3-3x=1$, to find the 3 roots of the equation.

Here $\frac{3b}{2a}\sqrt{\frac{3}{a}} = \frac{3}{6}\sqrt{\frac{3}{3}} = \frac{1}{2} = \cdot5 = \text{cos. } 60° = \text{A}.$

$$\text{Hence}\begin{cases} x = 2\,\text{cos.}\frac{60°}{3} = 2\,\text{cos. } 20° = \\ 1{\cdot}8793852 \\ x = -2\,\text{sine}\frac{150°}{3} = -2\,\text{sine } 50° = \\ -1{\cdot}5320888 \\ x = -2\,\text{sine}\frac{30°}{3} = -2\ \text{sine } 10° = \\ -{\cdot}3472964 \text{ all real.} \end{cases}$$

This improved method is the invention of Mr. Bonnycastle, who first gave the investigation of it in the 2d vol. of Hutton's Dict. Consult likewise, the Appendix to Frend's Algebra, and Dr. Hutton's ingenious paper on Cubics and Infinite series, in the Philosophical Transactions.

Mr. Barlow, of the Royal Military Academy, has lately computed a table for the solution of cubic equations of the irreducible form, by means of which the greatest root of any such equation may be readily and accurately obtained to eight or nine places of figures; the principle of which will be clearly understood from the following explanation. It has been before observed, that every cubic equation of the form $x^3-px=q$, falls under the irreducible case when $\frac{q}{4} \angle \frac{p^3}{27}$, or when $q^2 \angle \frac{4p^3}{27}$ Now every equation $x^3-px=q$, may be transformed to a similar equation $y^3-y=r$, in which transformed equation we have $r=\frac{q\sqrt{p}}{p^2}$, and $y=\frac{x}{\sqrt{p}}$, or $x=y\sqrt{p}$. So that the value of y being found in the latter equation, we know immediately that of x in the original one, because $x=y\sqrt{p}$; and since $x^3-px=q$, is of the irreducible form, the transformed or dependent equation $y^3-y=r$, is so likewise, and consequently $r^2 \angle \frac{4}{27}$, or $r \angle \frac{\sqrt{12}}{9}$, or $r \angle {\cdot}3849001$: therefore assuming this as the maximum value of r, we find that the greatest value of y cannot exceed $1{\cdot}1549$, nor the least value of the same root ever be less than 1. So that all possible values of the greatest roots in equations of the above form fall between the limits 1 and $1{\cdot}1549$. Now the table to which we have above alluded is made to exhibit all the values of r, corresponding to each of those of y, between the limits 1 and $1{\cdot}1549$; and consequently, the root of every cubic equation of the irreducible form, when reduced as above, may be found by inspection true to five places of figures, and these, by a simple proportion, may be extended to eight or nine figures true. Having, therefore, found the value of y in the transformed equation, true to the extent above mentioned, we are led to that of x in the original equation, because $x=y\sqrt{p}$. The only operations, therefore, that are requisite for the solution of the irreducible case by this method, consist in one extraction of the square root, (which being generally of a small number, may be supplied from tables where these numbers are given to a limited extent), one in division, and one in multiplication; which are very trifling when contrasted with any other method of solution that has been at present discovered for the solution of those equations. This table, which will occupy only six octavo pages, forms a part of a set of tables which have just been completed in manuscript by the gentlemen above mentioned; which, with an introduction, &c. will contain about 500 pages 8vo. and are principally designed for facilitating the solution of equations, particularly those of the 2d, 3d, and 4th degree, the extraction of square and cube roots of numbers to any extent, the computation of fluents, &c. where logarithms cannot be conveniently

employed, or not with a sufficient degree of accuracy.

IRREFRAGABI'LITY. *s.* (from *irrefragable.*) Strength of argument not to be refuted.

IRREFRA'GABLE. *a.* (*irrefragabilis*, Latin.) Not to be confuted; superiour to argumental opposition (*Swift*).

IRREFRA'GABLY. *ad.* (from *irrefragable.*) With force above confutation (*Atterbury*).

IRREFU'TABLE. *a.* (*irrefutabilis*, Latin.) Not to be overthrown by argument.

IRRE'GULAR. *a.* (*irregulier*, Fr. *irregularis*, Latin.) 1. Deviating from rule, custom, or nature (*Prior*). 2. Immethodical; not confined to any certain rule or order (*Milton. Cowley*). 3. Not being according to the laws of virtue.

Irre'gular Corol, in botany. Quæ limbi partibus, figura, magnitudine, aut proportione diversa est. Philos. Bot. In Delin. Pl. we read et proportione. Different in the figure, size, or proportion of the parts of the border. I prefer the disjunctive, because a diversity in any of the above recited circumstances is sufficient to produce an irregularity. The term is originally Rovinus's, whose arrangement is founded on the regularity or irregularity of the corol. Jungius expressed the idea by the term difformis; Ray, Tournefort, and others, by anomalus (flos). Dr. Berkenhout's explanation gives Jungius's idea. An irregular flower is that whose parts want uniformity.

IRREGULA'RITY. *s.* (*irregularité*, Fr.) 1. Deviation from rule. 2. Neglect of method and order (*Brown*). 3. Inordinate practice; vice (*Rogers*).

IRRE'GULARLY. *ad.* (from *irregular.*) Without observation of rule or method (*Locke*).

To IRRE'GULATE. *v. a.* (*in* and *regula*, Latin.) To make irregular; to disorder (*Brown*).

IRRE'LATIVE. *a.* (*in* and *relativus*, Lat.) Having no reference to any thing; single; unconnected (*Brown*).

IRRELI'GION. *s.* (*irreligion*, Fr.) Contempt of religion; impiety (*Rogers*).

IRRELI'GIOUS. *a.* (*irreligieux*, French.) 1. Contemning religion; impious (*South*). 2. Contrary to religion (*Swift*).

IRRELI'GIOUSLY. *ad.* (from *irreligious.*) With impiety; with irreligion.

IRRE'MEABLE. *a.* (*irremeabilis*, Latin.) Admitting no return (*Dryden*).

IRREME'DIABLE. *a.* (*irremediable*, Fr.) Admitting no cure; not to be remedied (*Bacon*).

IRREME'DIABLY. *ad.* (from *irremediable.*) Without cure (*Taylor*).

IRREMI'SSIBLE. *a.* (*irremissible*, Fr.) Not to be pardoned.

IRREMI'SSIBLENESS. *s.* The quality of being not to be pardoned (*Hammond*).

IRREMO'VEABLE. *a.* (*in* and *remove.*) Not to be moved; not to be changed (*Shaksp.*)

IRRENO'WNED. *a.* (*in* and *renown.*) Void of honour; unrenowned (*Spenser*).

IRRE'PARABLE. *a.* (*irreparabilis*, Latin.) Not to be recovered; not to be repaired (*Shakspeare*).

IRRE'PARABLY. *ad.* (from *irreparable.*) Without recovery; without amends (*Boyle*).

IRREPLE'VIABLE. *a.* (*in* and *replevy.*) Not to be redeemed. A law term.

IRREPREHE'NSIBLE. *a.* (*irreprehensibilis*, Latin.) Exempt from blame.

IRREPREHE'NSIBLY. *ad.* (from *irreprehensible.*) Without blame.

IRREPRESE'NTABLE. *a.* (*in* and *represent.*) Not to be figured by any representation (*Stillingfleet*).

IRREPRO'ACHABLE. *a.* (*in* and *reproachable.*) Free from blame; free from reproach (*Atterbury*).

IRREPRO'ACHABLY. *a.* (*in* and *reproachable.*) Without blame; without reproach.

IRREPRO'VEABLE. *a.* (*in* and *reproveable.*) Not to be blamed; irreproachable.

IRRESISTIBI'LITY. *s.* (from *irresistible.*) Power or force above opposition (*Hammond*).

IRRESI'STIBLE. *a.* (*irresistible*, Fr.) Superiour to opposition (*Hooker*).

IRRESI'STIBLY. *ad.* (from *irresistible.*) In a manner not to be opposed (*Rogers*).

IRRE'SOLUBLE. *a.* (*in* and *resolubilis*, Latin.) Not to be broken; not to be dissolved (*Boyle*).

IRRE'SOLUBLENESS. *s.* (from *irresoluble.*) Resistance to separation of the parts (*Boyle*).

IRRESO'LVEDLY. *ad.* (*in* and *resolved.*) Without settled determination (*Boyle*).

IRRE'SOLUTE. *a.* (*in* and *resolute*). Not constant in purpose; not determined (*Temp.*)

IRRE'SOLUTELY. *ad.* Without firmness of mind; without determined purpose.

IRRE'SOLUTION. *s.* (*irresolution*, Fr.) Want of firmnes of mind (*Addison*).

IRRESPE'CTIVE. *a.* (*in* and *respective.*) Having no regard to any circumstances (*Rogers*).

IRRESPE'CTIVELY. *ad.* Without regard to circumstances (*Hammond*).

IRRETRIE'VABLE. *a.* (*in* and *retrieve.*) Not to be repaired; irrecoverable; irreparable.

IRRETRIE'VABLY. *ad.* Irreparably; irrecoverably (*Woodward*).

IRRE'VERENCE. *s.* (*irreverentia*, Latin; *irreverence*, French.)
1. Want of reverence; want of veneration; want of respect (*Pope*). 2. State of being disregarded (*Clarendon*).

IRRE'VERENT. *a.* (*irreverent*, Fr.) Not paying due homage or reverence; not expressing or conceiving due veneration or respect (*Raleigh*).

IRRE'VERENTLY. *ad.* Without due re-

spect or veneration (*Government of the Tongue*).

IRREVE'RSIBLE. *a.* (*in* and *reverse.*) Not to be recalled; not to be changed (*Rogers*).

IRREVE'RSIBLY. *ad.* (from *irreversible.*) Without change (*Hammond*).

IRRE'VOCABLE. *a.* (*irrevocabilis*, Latin.) Not to be recalled; not to be brought back; not to be reversed (*Dryden*).

IRRE'VOCABLY. *ad.* (from *irrevocable.*) Without recall (*Boyle.*)

To I'RRIGATE. *v. a.* (*irrigo*, Lat.) To wet; to moisten; to water (*Ray*).

IRRIGA'TION. *s.* (from *irrigate.*) The act of watering or moistening (*Bacon*).

Irrigation. in agriculture, is the artificial watering of land. See Husbandry.

IRRI'GUOUS. *a.* (from *irrigate.*) 1. Watery; watered (*Milton*). 2. Dewy: moist (*Philips*).

IRRI'SION. *s.* (*irrisio*, Latin.) The act of laughing at another (*Woodward*).

IRRITABI'LITY. In physiology, the contractile power of a muscle upon the application of certain stimuli, without a consciousness of action. This is the usual definition of the term: but it does not appear to be quite correct; for plants as well as animals are, in many instances, possest of very high degrees of irritability and contractility, of which we have sufficient proofs in the hedysarum gyrans, the dionœa muscipula, and the urtica urens, or common stinging nettle, the sting of which consists of a minute drop of acrimonious fluid lodged in a small bleb or bladder at the root of every aculeus or prickle, and which, in consequence of the irritability both of itself and the prickles with which the plant is armed, and which are tubular, contracts upon being touched, and discharges its limpid, and to the naked eye invisible contents upon the hand or other substance that touches it. Yet plants are not, properly speaking, possessed of muscularity: they have no fibres that can in any respect be compared to the muscular fibres of animals, the immediate organ of animal irritability. The fibres of plants afford no gluten or ammonia, and are insensible to the action of Voltaic electricity.

The property of irritability, therefore, as applied to animals and vegetables, appears to depend upon powers altogether unconnected and distinct. What is the cause of it in *vegetables* has hitherto altogether eluded the researches of the physiologist: and but little indeed has ever been offered upon the subject by any inquirer whatever. In regard to animals the case is widely different; for if the cause have not been accurately ascertained, it has at least been conjectured, and accounted for by a variety of hypotheses, and the system of laws attempted to be traced by which the production of irritability is regulated.

We shall first examine the mode by which animal irritability has been attempted to be accounted for by those who have chiefly speculated upon this subject.

Glisson is said to be the first discoverer of the irritable principle in the solid fibre, a discovery which was afterwards enlarged upon by Haller, who found, by a variety of experiments, that the irritability of muscles remains a long time after their connexion with the brain is destroyed. To this principle he gave the name of *vis insita*. Fothergill, in his Hints on Animation, considers oxygen as the proximate cause of irritability. Girtanner looks upon himself to be the discoverer of the same principle in the fluids of the body; and it is to this celebrated physiologist, in conjunction with M. Humboldt, that we are indebted for the most curious observations on this principle. According to Girtanner, irritability is the principle of life in organized nature, and oxygen is the principle of irritability. His opinion is, that the irritable fibre, improperly as he contends, called the muscular fibre, is universally expanded through all organized nature; and that it is on this that organic motion, sensation, and even life depend. He affirms that this irritable fibre is the same in all parts, and subject to the same laws: that the fluids of animals are endued with irritability as well as the solids, their irritability consisting in their coagulability, which is subject to the same laws as that of the fibre: that the degree of irritability of the solids and fluids is continually changing, and is different according to the age or regimen of the same animal, according to the sex, animation, and size, of the individual: that the state of health, or the tone of the fibre, consists in a certain quantity of the irritable principle necessary to its preservation.

To maintain this state it is necessary that the action of the stimulus be sufficiently strong to deprive the fibre of the surplus of the irritable principle which the lungs and the circulation of the fluids continually furnish. When the irritability is totally destroyed, the fibre is in a state of gangrene; it changes its colour, becomes livid or black, and is then subject to the laws of unorganized matter. That the irritable fibre, from the first moment of its existence, to that of its dissolution, being constantly surrounded by bodies that act on it by stimulating it, and upon which it re-acts by its contraction, it follows that, during life, the irritable fibre is in a continual action; that life consists in action, and not in a passive state as some authors have advanced. According to the experiments of this physician, poisons act on the blood by depriving it, (as was before observed by Fontana,) of the principle of irritability or of its oxygen.

Humboldt, in like manner, regards irritability as the common foundation of all vital action: he asserts that it depends upon the property of the elementary parts of the

muscular fibre to change their relative situation on the approach of a stronger or weaker stimulus, whilst, in the sensible fibre of the nerve, the fluid is accumulated, known by the name of Galvanic or Voltaic; and he asserts, that by means of this Voltaic fluid the state of the irritable capacity of a muscle or nerve may be ascertained, for which experiment a metallic stimulus, composed of zinc and silver, is necessary. He lays down three principles, as necessary to excite the irritability.

1. *Oxygen*, which forms combinations with different acidifiable bases.

2. The *acidifiable bases* of the fibre with which the oxygen may combine. The acidifiable bases are *carbon*, with which it forms carbonic acid; *hydrogen*, with which it forms water or oxyde of hydrogen; azot, with which it forms oxyde of azot; *phosphorus*, with which it forms oxyde of phosphorus.

3. The *Voltaic fluid*.

It is therefore only in a just equilibrium of these principles that the necessary irritability of the parts consists: and on this hypothesis the different animal functions are a series of continual combinations produced in the body.

According to Mr. Davy the chief principles of the animal fibre are nitrogen, hydrogen, carbon, oxygen and light; and the immediate cause of irritable action is the combination of the oxygen with the hydrogen and carbon forming water and carbonic acid, and liberating the azot and electric fluid; since it is certain that water and carbonic acid are liberated during muscular action; and probably azot and light, in its condensed state electric fluid; as it is well known that the torpedo and some other animals give out the electric fluid during animal action.

Such are the supposed *causes* of irritability. Its *laws* are attempted to be reduced to somewhat of a systematic form by Dr. Crichton in his treatise on Mental Derangement, and are stated to be as follows:

1st. After every action in an irritable part a state of rest, or cessation from motion must take place before the irritable part can be again incited to action. If by an act of volition we throw any of our muscles into action, that action can only be continued for a certain space of time; the muscle becomes relaxed, notwithstanding all our endeavours to the contrary, and remains a certain time in that relaxed state, before it can be again thrown into action. 2. Each irritable part has a certain portion or quantity of the principle of irritability which is natural to it, part of which it loses during action, or from the application of stimuli. 3. By a process wholly unknown to us it regains this lost quantity during its repose or state of rest. In order to express the different quantities of irritability in any part, we say that it is either more or less redundant, or more or less defective. It becomes redundant in a part when the stimuli which are calculated to act on that part are withdrawn, or withheld for a certain length of time, because then no action can take place: while, on the other hand, the application of stimuli causes it to be exhausted, or to be deficient, not only by exciting action, but by some secret influence, the nature of which has not yet been detected; for it is a circumstance extremely deserving of attention, that an irritable part or body may be suddenly deprived of its irritability by powerful stimuli, and yet no apparent cause of muscular or vascular action takes place at the time. Thus a certain quantity of spirits taken at once into the stomach kills almost as instantaneously as lightning does: the same thing may be observed of some poisons, as opium, laurel-water, the juice of some poisonous vegetables, &c. 4. Each irritable part has stimuli which are peculiar to it; and which are intended to support its natural action: thus blood, which is the stimulus proper to the heart and arteries, if by any accident it gets into the stomach, produces sickness or vomiting. 5. Each irritable part differs from the rest in regard to the quantity of irritability which it possesses. This law explains to us the reason of the great diversity which we observe in the action of various irritable parts: thus the muscles of voluntary motion can remain a long time in a state of action, and if it be continued as long as possible, another considerable portion of time is required before they regain the irritability they lost; but the heart and arteries have a more short and sudden action, and their state of rest is equally so. The circular muscles of the intestines have also a quick action and short rest. 6. All stimuli produce action in proportion to their irritating powers. As a person approaches his hand to the fire, the action of all the vessels in the skin is increased, and it glows with heat; if the hand be approached still nearer, the actiou is increased to such an unusual degree as to occasion redness and pain; and if it be continued too long, real inflammation takes place; but if this heat be continued, the part at last loses it irritability, and a sphacelus or gangrene ensues. 7. The action of every stimulus is in an inverse ratio to the frequency of its application. A small quantity of spirits taken into the stomach increases the action of its muscular coat, and also of its various vessels, so that digestion is thereby facilitated. If the same quantity, however, be taken frequently, it loses its effect. In order to produce the same effect as at first, a larger quantity is necessary; and hence the origin of dram-drinking. 8. The more the irritability of a part is accumulated, the more that part is disposed to be acted upon. It is on this account that the activity of all animals, while in perfect health, is much

livelier in the morning than at any time of the day; for during the night the irritability of the whole frame, and especially, that of the muscles destined for labour, viz. the muscles of voluntary action, is re-accumulated. The same law explains why digestion goes on more rapidly the first hour after food is swallowed than at any other time; and it also accounts for the great danger that accrues to a famished person upon first taking in food. 9. If the stimuli which keep up the action of any irritable body be withdrawn for too great a length of time, that process on which the formation of the principle depends is gradually diminished, and at last entirely destroyed. When the irritability of the system is too quickly exhausted by heat, as is the case in certain warm climates, the application of cold invigorates the frame, because cold is a mere dimunition of the overplus of that stimulus which was causing the rapid consumption of the principle. Under such, or similar circumstances, therefore, cold is a tonic remedy; but if in a climate naturally cold, a person were to go into a cold bath, and not soon return into a warmer atmosphere, it would destroy life just in the same manner as many poor people, who have no comfortable dwellings, are often destroyed from being too long exposed to the cold in winter. Upon the first application of cold the irritability is accumulated, and the vascular system therefore is disposed to great action; but after a certain time all action is so much diminished, that the process, whatever it be, on which the formation of the irritable principle depends, is entirely lost. See article LIFE.

To I'RRITATE. *v. a.* (*irrito*, Latin.) 1. To provoke; to tease (*Clarendon*). 2. To fret; to put into motion or disorder by any irregular or unaccustomed contact; to stimulate; to vellicate (*Bacon*). 3. To agitate; to enforce (*Bacon*).

IRRITA'TION. *s.* (*irritatio*, Latin.) 1. Provocation; exasperation. 2. Stimulation; vellication (*Arbuthnot*).

IRROMANGO, one of the New Hebrides, in the S. Pacific Ocean. Lat. 18. 48. N. Lon. 169. 20. E.

IRRU'PTION. *s.* (*irruptio*, Latin.) 1. The act of any thing forcing an entrance (*Burnet*). 2. Inroad; burst of invaders into any place. (*Addison*).

I'RTYSH, a large river in Siberia, which running from the S. to the N. E. falls into the Oby near Tobolisk.

IRVI'NE, a royal borough and sea-port in Ayrshire, seated at the mouth of a river of the same name, on the frith of Clyde. Lat. 55. 38. N. Lon. 2. 41. W.

I'RWELL, a river in Lancashire, which rises above Bolton, flows thence to Manchester, and falls into the Mersey below Flixton.

IS. (ır, Saxon.) The third person singular of to be: I am, thou art, he is.

ISA'AC, the son of Abraham and of Sarah, was born 1896 B.C. His father was commanded to offer him up as a sacrifice, and was about to obey the divine command, when an angel stopped him. Isaac had two sons, Esau and Jacob; but his life affords only a few incidents. He died 1716 B. C.

ISA'BELLA, a town in the N. coast of Hispaniola. Lat. 19. 55. N. Lon. 36. 2. W.

ISABELLA *Fort*, a fort of Austrian Handers, seated on the W. side of the Scheldt, opposite Antwerp.

I'SÆUS, an orator of Chalcis, who came to Athens, and became the pupil of Lysias, and soon after the master of Demosthenes. Demosthenes imitated him in preference to Isocrates, because he studied force and energy of expression rather than floridness of style. Ten of his sixty-four orations are extant. Juv. &c.—Another Greek orator, who came to Rome A.D. 17, greatly recommended by Pliny the younger.

ISA'IAH, the principal of the four great prophets, was the son of Amos, and of the royal family of David. He prophesied in the reigns of Ozias, Jotham, Ahaz, and Hezekiah, from 735 to 681 B.C. in which last year it is said Manasseh caused him to be cut in two with a wooden saw. He is justly called the evangelical prophet, from the clear and constant view which he has taken of the Messiah throughout his predictions, which are composed in a style truly divine. Bishop Lowth's translation and notes first published, in 1778, throw considerable lights upon the composition and meaning of Isaiah.

ISA'TIS. Woad. In botany a genus of the class tetradynamia, order siliculosa. Silicle lanceolate, obtuse, deciduous, one-celled, one-seeded, with two-boat-shaped valves. Four species—all European plants, and one common to our own country: this is I. tinctoria, or commom woad, found wild in our fields, but often cultivated as of great use in the art of dyeing. See DYEING. Its specific character is root-leaves crenate; stem-leaves arrow-shaped; silicles rather obtuse, downy. There is another variety with the root-leaves obtuse and entire.

ISA'TIS, in zoology, a synonym of the canis lagopus.

I'SAURA, or ISAURUS, in ancient geography, a strong city, at mount Taurus. The country in which it stood was called Isauria, it was rugged and mountainous, and touched Pamphylia and Cilicia on the North.

ISCA DUMNIORUM, the ancient name of EXETER.

ISCA *Silurum*, the ancient name of CAERLEON.

ISCHŒMA'TIS. (from ισχω to restrain and αιμα blood.) Styptics. Medicines that restrain hœmorrhages.

ISCHŒMU'M. In botany a genus of the class polygamia, order monœcia. Hermaph. Calyx, glume two-valved, two-flowered, cartilaginous; corol glume two-valved; stamens three; styles two; seed one. Male;

stamens three. Eight species all natives of the East Indies.

ISCHA'LIS, the ancient name of ILCHESTER.

ISCHIA, an island in the Mediterranean, near the coast of Naples, about ten miles in circumference. It appears to have been formed by a volcano: for although no eruptions are now visible, scoria and lava are found, and several hot springs. It is mountainous, but fertile in fruits, and abounds in game; the white wine is much esteemed. The air is healthy, on which account it is much resorted to by invalids, as it is but a small distance from the continent, and hardly more than four leagues from Naples. Ischia, the town is situated on the north coast of the island, on a rock surrounded by the sea, and communicating with the island by means of a bridge. It is the see of a bishop, suffragan of Naples. Lat. 40. 41. N. Lon. 14. 2. E.

ISCHIA'DIC *a.* (ἰσχιαδικος.) In anatomy, an epithet to the crural vein: in pathology, the ischiadic passion is the gout in the hip, or the sciatica.

I'SCHIAS, (*Ischias*, *adis*, f. ιςχιας; from ισχίον, the hip). *Sciatica.* A rhuematic affection of the hip joint; one of the terminations of acute rheumatism.

ISCHIATOCE'LE, (*Ischiatocele*, *es*, f. ισχιαἶοκηλη; ισχιος, the hip, and κηλη, a rupture). *Ischiocele.* An intestinal rupture through the sciatic ligaments.

ISCHIOCAVERNO'SUS. See ERECTOR PENIS.

ISCHIOCE'LE, (*Ischiocele*, *es*, f. ιςχιοκηλη.) See ISCHIATOCELE.

ISCHIS (from ισχυς strength.) The loin, or seat of strength.

I'SCHIUM, (*Ischium*, *i*, n. ιςχιον; from ισχις, the loin, so named because it is near the loin). A bone of the pelvis of the fœtus. See INNOMINATUM OS.

ISCHURA'TICS (from ισχουρια.) Medicines which relieve a suppression of urine.

ISCHU'RIA, (*Ischuria*, *æ*, f. ισχυρια; from ισχις, to restrain, and ερον, the urine.) A suppression of urine. A genus of disease in the class locales and order epischeses of Cullen. There are four species of ischuria: 1. Ischuria renalis, coming after a disease of the kidneys, with a troublesome sense of weight in that part. 2. Ischuria ureterica, after a disease of the kidneys, a sense of pain or uneasiness in the course of the ureters. 3. Ischuria vesicalis, a frequent desire to make water, with a swelling of the hypogastrium, and pain at the neck of the bladder. 4. Ischuria urethralis, a frequent desire to make water, with a swelling of the hypogastrium, and pain of some part of the urethra.

ISELA'STICS, games or combats celebrated in Greece and Asia, in the time of the Roman emperors. The victor had very considerable privileges conferred on him.

I'SENBURG, a large town of Germany, capital of a county of the same name, with a handsome castle, seated on the river Iser. Lat. 50. 42. N. Lon. 7. 34. E.

ISER, a river of Germany, which rises in the Tyrolese, about five miles north from Inspruck, passes by Munich, Mospurg, Landshut, Dingelfingen, Landau, &c. and runs into the Danube, two miles below Deckendorf.

ISERE, a department of France, which includes part of the late province of Dauphiny. It is named from a river which rises on the confines of Savoy, and falls into the Rhone, above Valence.

INSERI'NE, in mineralogy. See TITANIUM.

I'SERNIA, a town of Naples, in Molise, with a bishop's see. It is seated at the foot of the Appenines. Lat. 41. 36. N. Lon. 14. 24. E.

ISE'RTIA. In botany a genus of the class hexandria, order monogynia. Calyx superior, six-toothed; corol funnel-form, six-cleft; stigma six-cleft, some six-celled, many-seeded. Two species: one a cayenne tree with opposite, lance-elliptic leaves: terminal panicles: the other with oblong glabrous leaves, and ovate thyrse.

ISH. *s.* (ıꞅc, Saxon.) 1. A termination added to an adjective to express diminution of any quality: as, bluish, tending to blue. 2. It is likewise sometimes the termination of a genitive or possessive adjective: as, Swedish. 3. It likewise notes participation of the qualities of the substantive to which it is added: as, man, manish.

ISIA, feasts and sacrifices anciently solemnized in honour of Isis. They were full of the most abominable impurities.

ISIAC *table*, one of the most considerable monuments of antiquity, discovered at Rome in 1525, and supposed (on account of its various figures in bas-relief) to represent the feasts of Isis, and other Egyptian deities. Respecting the antiquity of this monument there are various conjectures.

ISIACI, priests of the goddess Isis: they bore a branch of sea-wormwood in their hands instead of olive; sung the praises of the goddess twice a day, viz. at the rising of the sun, when they opened her temple; after which they begged alms the rest of the day, and returning at night, repeated their orisons, and shut up their temple.

I'SICLE. *s.* (more properly *icicle*, from *ice.*) A pendent shoot of ice (*Dryden*).

ISIGNI, a sea-port of France, in the department of Calvados, noted for its salt-works, cider, and butter. Lat. 49. 20. N. Lon. 0. 59. W. There is a town of the same name, but of small note, in the department of the channel, and district of Martain.

I'SINGLASS, a well-known gelatinous substance, otherwise called Icthyocolla, or fish-glue. For particulars concerning it, the reader is referred to the latter part of the article GELATIN in this work: See also ICHTHYOCOLLA, and a valuable paper. "On the

manner of making Isinglass in Russia, with a particular description of its manufacture in England from the produce of British fisheries. By Humphrey Jackson Esq." in vol. 62. Phil. Trans. or New Abridgement, vol. 13. p. 361—367.

ISIS, a celebrated deity of the Egyptians, daughter of Saturn and Rhea, according to Diodorus, of Sicily. Some suppose her to be the same as Io, who was changed into a cow by her lover Jupiter, and restored to her human form in Egypt, where she taught agriculture, and received divine honours after death. Isis was the Venus of Cyprus, the Minerva of Athens, the Cybele of the Phrygians, the Ceres of Eleusis, the Proserpine of Sicily, the Diana of Crete, the Bellona of the Romans, &c. Osiris and Isis reigned conjointly in Egypt; but the rebel lion of Typhon, the brother of Osiris, proved fatal to this sovereign (Vid. Osiris and Typhon). The ox and cow were the symbols of Osiris and Isis, because these deities, while on earth, had diligently applied themselves to cultivating the earth (Vid. Apis). Isis was also supposed to be the moon, and Osiris the sun. The Egyptians believed that the inundations of the Nile proceeded from the tears which Isis shed for the loss of Osiris, whom Typhon had murdered. The worship of Isis was universal in Egypt; Cleopatra, the beautiful queen of Egypt, was wont to dress herself like this goddess, and effected to be called a second Isis.

The following is an encomium of Isis related by Diodorus, as it is engraven on a column.

"I am Isis the queen of Egypt, instructed by Mercury. Nobody can abolish what I have established by my ordinance. I am the wife of Osiris, I have first invented the use of corn. I am the mother of king Horus. I shine in the dog-star. By me the city of Bubasti was founded: wherefore rejoice thou, Egypt. rejoice thou, thou hast brought me up and fed me."

The Egyptians ascribed the overflowings of the Nile, to the tears that she shed for the death of her husband Osiris.

We have a statue of Isis habited like a Roman Matron, having a half moon on the top of her Head, her right hand turned towards Heaven, and her left towards the earth, to inform us, that she receives the influence of Heaven. We have also a medal of the emperor Commodus, where Isis is represented with a half moon, holding a sphere with her right hand, and a vessel full of fruits with her left. The sphere denotes astrology, wherein the Egyptians excelled; and the fruits the fecundity of Egypt.

Isis, a name often given to the river Thames, before it joins the Thame at Dorchester.

Isis. In zoology. Coral, a genus of the order zoophyta, class vermes. Animal growing in the form of a plant; stem stony, jointed, the joints longitudinally striate, united by spongy or horny junctures, and covered by a soft porous cellular flesh or bark; mouth beset with oviparous polypes. Six species as follow:

1. I. Hippuris. With white striate joints and black junctures: of which there are two varieties. They inhabit the indian seas; growing to rocks; and are from two inches to two feet long; stony joints longer, black junctures more contracted.

2. I. Dichotoma. Stem coralline, with smooth joints, and decorticated junctures. Inhabits the Indian and Ethiopic seas; about half a foot high; somewhat flexuous; joints clear flesh-colour, with a cinnabar flesh beset with convex papillæ.

3. I. ochrasea. Stem coralline, with decorticated joints and knotty junctures. Inhabits the East Indies among the Spice Islands; deep red sometimes white with the junctures brownish-yellow; stem irregularly channelled, as if eaten into; branches numerous, dichotomous, spread; joints connected by deep, yellow, spongy knobs; flesh pale yellow, full of stellate mouths; polypes with eight claws.

4. I. Entrocha. Stem testaceous, round, with orbicular, perforated joints, and verticillate, dichotomous branches. Inhabits the Ocean. Stem about the thickness of a finger with crowned, flat, orbicular joints perforated in the centre, the perforation pentangular, with the disk substriate from the centre: outer-bark or flesh unequal and surrounded by a row of tubercles; branches thin, dichotomous, continued and not jointed.

It should seem, therefore, that those fossile bodies called *Entrochi* are petrified specimens of this species of Coral.

5. I. Asteria. Stem testaceous, jointed, pentagonal; branches verticilate, with a terminal dichotomous star. Inhabits the ocean, and is found fossile in our own country and in all other parts of Europe; and known by the name of the *Star-stone*.

6. I. Coccinea. Stem jointed, slender, very red, and subtriate: flesh on the outside, covered with small scarlet prominent cells each furnished with a mouth. Inhabits the Indian Ocean, two or three inches high. A very minute coral with irregularly spreading branches, and is sometimes, but very rarely, found quite white.

The calcareous matter of these animals is often used in medicine as an absorbent earth; but it does not seem to possess any medicinal virtue beyond that of common chalk. From the occasional difference of its colour it is called in the dispensatorie *corallium album*—*white coral*, or *corallium rubrum*, *red Coral*, yet the red coral is more frequently the *gurgonia nobilis*; which see, as also Millipora.

I'SLAM, or Islamism, the true faith, according to the Mahometans. See Mahometanism.

I'SLAND, or Isle, a tract of dry land encompassed with water; either with the sea, a river or lake. In which sense island stands

contradistinguished from continent, or terra firma.

Floating-Islands. Histories are full of accounts of floating-islands; but the greater part of them are either false, or founded on exaggerations. What we generally see of this kind is no more than the concretion of the lighter and more viscous matter floating on the surface of water in cakes, and with the roots of plants, forming congeries of different sizes, which not being fixed to the shore in any part, are blown about by the winds, and float on the surface. These are generally found in lakes, where they are confined from being carried too far; and from being broken by the agitation of the water.

I'SLANDER, an inhabitant, or a native of a country surrounded with water.

ISLA'NDICUS Muscus. See Lichen *Islandicus*.

ISLA'Y. See Ilay.

ISLE. *s.* (*isle*, French. Pronounced *ile.*) 1. An island; a country surrounded by water (*Waller*). 2. A long walk in a church, or public building (*Pope*).

ISLE-Adam, a town of France, in the department of Seine and Oise, with a castle seated on the Oise. Lat. 49. 7. N. Lon. 2. 13. E.

Isle *de-dieu*, a small island of France, 14 miles from the coast of Poitou. Lon. 2. 15. W. Lat. 46. 45 N.

Isle-*de-France*. See France, *Isle of*.

Isle-*Jourdain*, a town of France in the department of Gers, and late province of Armagnac, in an island of the little river Save, eight miles N. of Lombez. Lon. 1. 2. E. Lat. 43. 40. N.

Isle and Vilaine, a department of France, containing part of the late province of Bretagne. Renns is the capital.

I'SLEWORTH, a village in Middlesex, seated on the Thames, 9 miles W. of London.

I'SLINGTON, a village of Middlesex, on the north side of London, to which it is almost contiguous. It appears to be of Saxon origin; and in the conqueror's time was written Isledon, or Isendon. The church is one of the prebends of St. Paul's; to the dean and chapter of which a certain precinct here belongs, for the probate of wills, and granting administrations. The church was a Gothic structure, erected in 1503, and stood till 1751, when the inhabitants applied to parliament for leave to rebuild it, and soon after erected the present structure, which is a very substantial brick edifice, though it does not want an air of lightness. Its houses are above 4000, including the Upper and Lower Holloways, three sides of Newington-green, and part of Kingsland, on the road to Ware. The White Conduit-house in this place, so called from a white stone conduit that stands before the entrance, has handsome gardens with good walks, and two large rooms one above the the other for the entertainment of company at tea, &c. In this village is the celebrated place of entertainment called Sadler's Wells.

ISLIP, a village in Oxfordshire, 4 miles N. of Oxford. It is noted for the birth and baptism of Edward the Confessor. The chapel in which the ceremony was performed, stands a little N. of the church, and is still called the king's chapel; it has now a roof of thatch.

Islip, a village in Northamptonshire, separated from the town of Thrapston by the river Nen, over which here is a long stone bridge.

ISMAELI'TES, the descendants of Ismael; dwelling from Havila to the wilderness of Sur, towards Egypt, and thus overspreading Arabia Petræa; and therefore Josephus calls Ismael the founder of the Arabs.

ISMA'IL, a strong town of Turkey in Europe, in Bessarabia. It was taken by storm, by the Russians, on 22d of December 1790; and it is said, that the long siege, and the capture did not cost them less than 10,000 men. The most shocking part of the transaction is, that the garrison (whose bravery merited, and would have received from the generous foe, the highest honours) were massacred in cold blood by the merciless Russians, to the amount, by their own account of 30,000 men: and the place was abandoned to the fury of the brutal soldiery. Ismail is seated on the N. Side of the Danube. Lat. 45. 11. N. Lon. 29. 30. E.

ISNA'DIA. In botany a genus of the class tetrandria, order monogynia. Corolless; calyx four-cleft; capsule four-celled, surrounded by the calyx. One species only—an aquatic annual plant common to Europe and America.

I'SNIC, a town of Turkey in Asia, and in Natolia, with a Greek archbishop's see. It is the ancient Nice, famous for the first general council held here in 325. Lat. 40. 13. N. Lon. 30. 9. E.

ISO'CHRONAL, or Isochronous, is applied to such vibrations of a pendulum, as are performed in equal times.

Of which kind are all the vibrations or swings of the same cycloidal pendulum, whether the arcs it describes be longer or shorter; for when it describes a shorter arc, it moves so much the slower; and when a long one, proportionably faster.

Isochronal *Line*, is that wherein a heavy body is supposed to descend without any acceleration.

Leibnitz, in the Act. Erud. Lips. for April, 1689, has a discourse on the linea isochrona, in which he shews, that a heavy body, with a degree of velocity acquired by its descent from any height, may descend from the same point by an infinite number of isochronal curves, which are all of the same species, differing from one another only in the magnitude of their parameters (such as are all the quadratocubical paraboloids), and consequently similar to one another. He shews also, how to find a line, in which

a heavy body descending, shall recede uniformly from a given point, or approach uniformly to it.

ISOCRA'TES, the most conspicuous of this name is an orator, son of a rich musical instrument-maker at Athens. He has always been much admired for the sweetness and graceful simplicity of his stile, for the harmony of his expressions, and the dignity of his language. The remains of his orations extant inspire the world with the highest veneration for his abilities, as a moralist, an orator, and above all, as a man. About thirty-one of his orations are extant. The defeat of the Athenians at Checonæa, by Philip of Macedon, had such an effect on his spirits, that he died, after he had been four days without aliment, in the 99th year of his age, about 338 B. C.

I'SOETES. In botany a genus of the class cryptogamia, order musci. Its popular name is Quillwort. Male and within the base of the inner leaves; anthers solitary on an inversely heart-shaped receptacle. Fem, within the base of the outer leaves; germ on an inversely heart-shaped receptacle; capsule membranaceous; seeds numerous, angular rough. Two species.

Of which one is, I. Lacastrix common to our own country.

I'SOLA, a sea-port town of Italy, in the kingdom of Naples, and in the farther Calabria, with a bishop's see. Lat. 39. 1. N. Lon. 17. 26. E.

I'SOMERIA, a term in algebra, sometimes used by Vieta, and denoting the freeing an equation from fractions.

ISO'PERIMETRICAL *Figures*, are such as have equal perimeters, or circumferences. It is demonstrated in geometry, that among isoperimetrical figures, that is always the greatest which contains the most sides or angles.—From whence it follows, that the circle is the most capacious of all figures which have the same circumference with it.

The analysis of the general problem concerning figures that, among all those of the same perimeter, produce maxima and minima, was given by Mr. James Bernoulli, from computations that involve 2d and 3d fluxions. And several inquiries of this nature have been since prosecuted in like manner, but not always with equal success. Mr. Maclaurin to vindicate the doctrine of fluxions from the imputation of uncertainty, or obscurity, has illustrated this subject, which is considered as one of the most abstruse parts of this doctrine, by giving the resolution and composition of these problems by first fluxions only; and in a manner that suggests a synthetic demonstration, serving to verify the solution. See Maclaurin's Fluxions, p. 486; and Simpson's Fluxions, p. 98.

M. Lhuilier has some elementary problems on isoperimeters, in his "Polygonometrie." Thus he shews from the simplest geometrical principles, 1st. That, of all triangles having the same base and the same perimeter, the isosceles triangle has the greatest surface. 2dly, Of all isoperimetrical triangles, the equilateral has the greatest surface. 3dly. Of all isoperimetrical figures whose number of sides is given, that which is the greatest has all its sides equal. 4thly. If a circle and a figure circumscribable about a circle are isoperimeters, the surface of the circle is a geometrical mean proportional between that figure and a similar figure circumscribed about the same circle. 5thly. If a circle and a figure circumscribable about a circle are equal, the perimeter of that figure is a geometrical mean proportional between the perimeter of the circle and the perimeter of a similar figure circumscribed about the same circle. 6thly. The circle is greater than any rectilinear figure of the same perimeter; and it has a perimeter smaller than any rectilinear figure of the same surface. 7thly. The surface of regular isoperimetrical figures are so much the greater as the number of their sides is the greater: and the perimeters of equal regular figures are the smaller as the number of their sides is the greater. 8thly. Of all right cones that whose side is triple the radius of the base, has the total surface the smallest, and reciprocally. 9thly. The sphere is greater than any solid of the same surface, circumscribable about a sphere; and reciprocally.

ISO'PSEPHUS, ισοψηφος, in antiquity an appellation given to judges, who had equal jurisdiction and authority! it was likewise applied to a case where the votes were equal on both sides.

ISO'PYRUM. In botany a genus the class polyandria, order polygymia. Calyx less: petals five, nectaries three-cleft, tubular; capsules recurved, many-seeded. Three species:—two natives of the Alps; one of Siberia.

ISO'SCELES *Triangle*, (of ισος, *equal*, and σκελος, *leg*.) is a triangle which has two equal sides. In an isosceles triangle, the angles and opposite to the equal sides, are equal; and a line drawn from the top or vertex, cutting the base into two equal parts, is perpendicular, to the base. The same line, also bisects the vertical angle of the triangle.

ISPA'PHAN, a city of Persia, and capital of the whole country, situated on the river Zenderoud, in the province of Irac, surrounded by a wall and ditch, and defended by a castle. The walls are built of mud, and are about 20,000 paces in compass; but kept in no repair, and so hidden by the adjoining houses and gardens, that they cut no figure, and are hardly to be discovered. The beauty of the city consists chiefly in a great number of sumptuous palaces, handsome and airy houses, spacious caravanseras, very beautiful bazars, many canals, and streets planted on both sides with lofty plane-trees; though, generally speaking, the other streets are

narrow, crooked, and not paved: but the air being very dry here, and every housekeeper causing the street to be watered before the door twice a day, there is neither so much dirt nor dust as in many great cities in Europe. The Meidan Shah, or Royal Square, is one of the finest in the world. It is four hundred and forty paces long, and one hundred and sixty broad, and is surrounded by a canal, built with bricks, cemented with a black mortar, which, in time, becomes harder than free-stone. The royal mosque is at the south end of this square, and its portico is wonderfully adorned with a thousand figures, and an inconceivable profusion of gold and azure, the whole being also enlaid with enamelled squares, and a frieze round it of the same materials. Few structures can equal the magnificence of this, many of its pieces and decorations being wrought in a manner unknown to our European architects. The same may be said of the royal palace, and the haram, or woman's apartment. The palace is certainly one of the most spacious in the world, being near a league and a half in compass. Its great portico stands in the royal square, and is all built with porphyry, and very high. The Persians revere it as sacred. The suburbs of Ispaphan are very large, and chiefly inhabited by Armenians. There are besides 1460 villages round about Ispahan, and the inhabitants live chiefly upon the manufacturing of silk and wool. Lat. 32. 25. N. Lon. 52. 25. E.

I'SRAEL, the name which the angel gave Jacob, after having wrestled with him all night at Mahanaim or Penuel (Gen. xxxii. 1, 2, and 28, 29, 30. and Hosea xii. 3.) It signifies the conqueror of God, or a prince of God, or, according to many of the ancients, a man who sees God. By the name of Israel is sometimes understood the person of Jacob; sometimes the whole people of Israel, or the whole race of Jacob; and sometimes the kingdom of Israel, or of the ten tribes, distinct from the kingdom of Judah.

ISRAELI'TES, the descendants of Israel; who were at first called Hebrews, by reason of Abraham, who came from the other side of the Euphrates; and afterwards Israelites, from Israel the father of the twelve patriarchs; and lastly Jews, particularly after their return from the captivity of Babylon.

ISSA'CHAR, one of the divisions of Palestine by tribes; lying to the south of Zabulon, so as by a narrow slip to reach the Jordan, between Zabulon and Manasseh, Josh. xix. But whether it reached to the sea is a question.

ISSEL, or Yessel, a river of the United Provinces, which rises in Westphalia, runs N. by Doesburg, afterward by Zutphen, Deventer, and Campen, and soon falls into the Zuider-Zee, by two mouths.

Issel, or Yessel, the little, another river of the United Provinces, which waters Ysselstein, Montfort, and Gouda; and falls into the Maese, a mile and a half above Rotterdam.

ISSOIRE, an ancient town of France, in the department of Puy de Dome. It is seated on the Couze. Lat. 45. 34. N. Lon. 3. 15. E.

ISSO'UDUN, a town of France, in the department of Indre. It is seated on the Theols. Lat. 46. 57. N. Lon. 2. 6. E.

I'SSUE. *s.* (*issue*, French.) 1. The act of passing out. 2. Exit; egress; passage out (*Proverbs*). 3. Event; consequence (*Fairfax*). 4. Termination; conclusion (*Broome*). 5. Sequel deduced from premises (*Shaksp.*) 6. A fontanel; a vent made in a muscle for the discharge of humours (*Wiseman*). 7. Evacuation (*Matthew*). 8. Progeny; offspring (*Dryden*). 9. (In law.) *Issue* hath divers applications: sometimes used for children begotten between a man and his wife; sometimes for profits growing from an amercement; sometimes for profits of lands or tenements; sometimes for that point of matter depending in suit, whereupon the parties join and put their cause to the trial of the jury (*Cowell*).

To I'SSUE. *v. n.* (*isser*, French.) 1. To come out; to pass out of any place (*Pope*). 2. To make an eruption; to break out (*Dryden*). 3. To proceed as an offspring (*Kings*). 4. To be produced by any fund (*Ayliffe*). 5. To run out in lines (*Bacon*).

To Issue. *v. a.* 1. To send out; to send forth (*Bacon*). 2. To send out judicially or authoritatively (*Clarendon*).

I'SSUELESS. *a.* (from *issue.*) Having no offspring; wanting descendants (*Carew*).

ISSUS, a town of Cilicia, on the confines of Syria, famous for a battle fought there between Alezander the Great and the Persians under Darius their king, in October, B. C. 333. In this battle the Persians lost 100,000 foot, 10,000 horse, and the Macedonians only 300 foot, and 150 horse, according to Diodorus Siculus. The Persian army, according to Justin, consisted of 400,000 foot, and 100,000 horse, and 61,000 of the former, and 10,000 of the latter, were left dead on the spot, and 40,000 were taken prisoners The loss of the Macedonians, as he farther adds, was no more than 130 foot and 150 horse. According to Curtius, the Persians slain amounted to 100,000 foot, and 10,000 horse! and those of Alexander to 32 foot, and 150 horse, killed, and 504 wounded. This spot is likewise famous for the defeat of Niger by Severus, A. D. 104.

ISTHMIA, sacred games among the Greeks, instituted B. C. 1326. They received their name from the isthmus of Corinth, where they were observed. They were celebrated in commemoration of Melicerta, who was changed into a sea deity, when his mother Ino had thrown herself into the sea with him. They were for some time interrupted, but Theseus at last reinstituted them in honour of Neptune, whom he publicly called his father. These games were observed

every third, or rather fifth year. Combats of every kind were exhibited, and the victors were rewarded with garlands of pine leaves. Some time after the victor received a crown of withered parsley.

ISTHMUS, a narrow neck, or slip of ground, which joins two continents; or joins a peninsula to the terra firma, and separates two seas. See PENINSULA. The most celebrated isthmuses are, that of Panama or Darien, which joins North and South America; that of Suez, which connects Asia and Africa; that of Corinth, or Peloponnesus, in the Morea; that of Crim-Tartary, otherwise called Taurica Chersonesus; that of the peninsula Romania, and Erisso, or the isthmus of the Thracian Chersonesus, twelve furlongs broad, being that which Xerxes undertook to cut through.

ISTHMUS VIEUSSENII. The ridge surrouding the oval fossa or remains of the foramen ovale, in the right auricle of the human heart.

ISTRIA, a peninsula of Europe, bounded on all sides by the sea, except towards the north, where it is joined to Carniola. It was anciently a part of Illyrium; but being conquered by the Romans, between the first and second Punic wars, was annexed to Italy. At present, part of it belongs to the Venetians, and part to the house of Austria.

IT. *pronoun.* (hıꞇ, Saxon.) 1. The neutral demonstrative (*Cowley*). 2. *It* is used absolutely for the state of a person or affair (*Shakspeare*). 3. *It* is used for the thing; the matter; the affair (*Shakspeare*). 4. *It* is used ludicrously after neutral verbs, to give an emphasis (*Locke*). 5. Sometimes applied familiarly, ludicrously or rudely to persons (*Shakspeare*).

ITALIAN, the language spoken in Italy. This tongue is derived principally from the Latin, and of all the languages formed from the Latin, there is none which carries with it more visible marks of its original than the Italian.

It is accounted one of the most perfect among the modern languages. It is complained, indeed, that it has too many diminutives aud superlatives, or rather augmentatives; but without any great reason: for if those words convey nothing farther to the mind than the just ideas of things, they are no more faulty than our pleonasms and hyperboles.

The language corresponds to the genius of the people; they are slow and thoughtful; and accordingly, their language runs heavily, though smoothly; and many of their words are lengthened out to a great degree.—They have a great taste for music; and, to gratify their passion this way, have altered abundance of their primitive words; leaving out consonants, taking in vowels, softening and lengthening out their terminations, for the sake of the cadence.

Hence the language is rendered extremely musical, and succeeds better than any other in operas, and some parts of poetry: but it fails in strength and nervousness: hence also a great part of its words, borrowed from the Latin become so far disguised, that they are not easily known again.

The multitude of sovereign states into which Italy is divided, has given rise to a great number of different dialects in that language; which, however, are all good in the place where they are used.—The Tuscan is usually preferred to the other dialects, and the Roman pronunciation to that of the other cities; whence the Italian proverb, *Lingua Toscana in bocca Romana.*

ITALIAN *Courier*, in ornithology. See CORRIRA.

ITA'LIC CHARACTER, in printing. See LETTER.

ITA'LICA, in ancient geography, a town of Bœtica, in Spain, built by Scipio Africanus. It was the birth-place of Trajan, Adrian, and the poet Silius Italicus: in the same place now stands a small village called Sevilla Vieja, four miles from Seville.

ITA'LY, one of the finest countries of Europe. On the north, N. W. and N. E. it is bounded by France, Swisserland, the country of the Grisons, and Germany; on the E. by the gulph of Venice; and on the S. and W. by the Mediterranean; its figure bearing some resemblance to that of a boot. Its length, from Aousta, at the foot of the Alps, in Savoy, to the utmost verge of Calabria, in the kingdom of Naples, is about 600 miles; but its breadth is very unequal, in some places near 400 miles, in others not above 25 or 30. It is the most celebrated country in Europe, having been formerly the seat of the Roman empire, and, afterwards, of that astonishing universal usurpation, the spiritual dominion of the Pope.

Italy had several names, sometimes it was called *Hesperia*, either from Hesperus, brother to Atlas, king of Mauritamia, or Hesperus the star of Venus, called Lucifer, at the rising of the sun; and Hesperus or Vesper in the evening when the sun sets. Wherefore the Greeks have called the western parts of Italy, Hesperia magna, to distinguish it from Spain, called Minor Hesperia.

Italy was also called *Oenotria*, of Oenotrus king of the Sabins, or Oenotrus the son of Lycaon king of Acadia, or rather from the Greek word οἶνος, *wine*, which *Janus* brought into this country, by planting there the vine. They gave her also the name of *Ausonia*, from Ausonius the son of Ulysses and Calypso.

That country is now called *Italia*, Italy, either of Italus king of Sicily, or from Oxen called ἰταλοι in the old Greek,

Italiam dixisse minores. VIRG.

Strabo, speaking of Italy, gives it this following encomium:—"There," says he, "men breathe a temperate air; there are abundance of fountains, the waters thereof cure several distempers, and preserve health.

There are all sorts of excellent fruits, and quarries of marble of several colours. The inhabitants thereof are witty, subtle and cunning, fit for learning, and principally poetry and eloquence; but are great dissemblers and revengeful, even to the very altars. The chief city of Italy is Rome, famous for the birth of several great men, both in war and peace."

The Romans have represented Italy in their medals like a queen sitting upon a globe, holding with her right hand a horn of plenty, having the other arm and the breast uncovered. With this title *Italia.* Italy is, or at least till very lately, has been divided into a great number of states, which differ much in extent and importance. Between the confines of France and Swisserland, on the west and north, are the continental dominions of the king of Sardinia, namely, Piedmont, Savoy, Montserrat, part of the Milanese, and Oneglia. To the north east are the territories of Venice, which are enumerated under that article. South of these, are the Italian dominions of the emperor, namely, part of the Milanese, and Mantuan. South of these, are Modena, Mirandola and Reggio, belonging to the Duke of Modena. West of these, are the duchies of Parma, Placentia, and Guastalla, whose sovereign is of the house of Bourbon. South of Parma lies the republic of Genoa, and south east of this, that of Lucca. Hence extends, along the coast of the Mediterranean, the grand duchy of Tuscany, whose sovereign is brother to the present emperor of Austria. The ecclesiastical state, or territory of the pope, lies principally to the east and south east of Tuscany, between the gulph of Venice and the Mediterranean; and the remainder of Italy, which occupies the whole southern extremity, is the kingdom of Naples, with its dependent islands, of which Sicily is the principal. The air of Italy is very different, according to the different situations of the countries it contains. In those on the north sides of the Appennines, it is more temperate; but on the south it is very warm. The air of the Campagna of Rome, and of the Ferrarese, is said to be unwholesome; which is owing to the lands not being duly cultivated, nor the marshes drained. That of the other parts is generally pure, dry, and healthy. In summer the heat is very great in the kingdom of Naples, and would be almost intolerable, if it were not mitigated by the sea-breezes. The principal rivers are the Po, Tiber, Arno, Adige, and Var; and there are several fine lakes, as the Maggiore, Lugano, Como, Garda, Perugia, Bracciano, and Celano. As there are a number of rivers in Italy, besides those mentioned above, the soil, in general, is very fertile. It produces a great variety of wines, and the best oil in Europe; excellent silk in abundance; corn of all sorts, but not in such plenty as in other countries; oranges, lemons, citrons, pomegranates, almonds, raisins, sugar, innumerable mulberry trees, figs, peaches, nectarines, apricots, pears, apples, filberds, chestnuts, &c. Most of these fruits were first imported by the Romans from Asia Minor, Greece, Africa, and Syria, and were not the natural products of the soil. The tender plants are sheltered, in winter, on the north side of the Apennines; but on the south side they have no need of that precaution. This country also yields good pasture, and abounds with cattle, sheep, goats, buffaloes, wild boars, mules and horses. The forests are well stored with game; and the mountains have not only mines of iron, lead, alum, sulphur, marble of all sorts, alabaster, jasper, porphyry, &c. but also gold and silver; with a great variety of aromatic herbs, trees, shrubs, and evergreens, as thyme, lavender, laurel, wild olive trees, tamarinds, junipers, oaks, and pines. Wine, oil, perfumes, fruits, and silks, are the principal articles of exportation; and great sums of money are expended by travellers in the purchase of pictures, curiosities, relics, antiquities, &c. The Italians are generally well-proportioned; but of their complexion they cannot boast. With respect to dress, they follow the fashions of the countries on which they border, or to which they are subject; namely, those of France, Spain, and Germany. As to their genius and taste in architecture, painting, carving and music, they are thought to excel greatly the other nations of Europe: but their music, perhaps, is too soft and effeminate to merit all the praises bestowed upon it; and their houses, in respect to convenience, are far inferior to those of England. No country has produced better politicians, historians, poets, painters, and sculptors; that is, since the revival of the arts and sciences, exclusive of those of ancient times. The governments of several of the principalities, duchies, and republics of Italy have undergone various changes, since the French revolution; and some of them will probably undergo other changes still, before the affairs of the continent are brought to a settled state: we therefore think it would be improper to enter minutely into these particulars here. At present the whole of Italy is a *kingdom* on the throne of which the emperor of the French places whomsoever he pleases. Since his determination to marry young wives as frequently as he needs them, that is, until he has a son, he has determined that that son shall be called *King of Rome.* Rome, therefore, is to be reckoned the second city of the French empire. The pope is in consequence deprived of all secular dominion, is made a mere dependent upon the caprice of Napoleon, and is to reside half the year at Rome, the other half at Paris!

ITCH, a cutaneous disease, supposed to be caused by an insect, a species of the genus Acarus, viz. A scabiei, which, when

viewed by a good microscope, is white with reddish legs; the four hind ones having a long bristle. It is found in the small pellucid vesicles with which the hands and joints of persons infected with the itch are covered. It appears to be not only the cause of the disorder, but the reason why it is so highly infectious. See ACARUS, and MEDICINE.

ITCH signifies also—1. The sensation of uneasiness in the skin, which is eased by rubbing. 2. A constant teasing desire (*Pope*).

To ITCH. *v. n.* (from the noun.) 1. To feel that uneasiness in the skin which is removed by rubbing (*Dryden*). 2. To long; to have continual desire (*Shakspeare*).

I'TCHY. *a.* (from *itch.*) Infected with the itch.

I'TCHEN, or ALRE, a river in Hants, which rises near Alresford, and falls into the bay of Southampton.

IT orITE, a termination in the new chemical nomenclature, adopted for the purpose of designating a certain class of compound salts, resulting from the union of acids in their weakest state with different bases, in the same manner as the termination AT or ATE is applied to those salts which contain the same acids in a state of saturation with oxygen. Thus *sulphit* or *sulphite, of potash* is a combination of that alkali with *sulphurous* acid; while *sulphat of potash* is produced by a union of the alkali with *sulphuric* acid. See CHEMISTRY and NOMENCLATURE.

I'TEA. In botany a genus of the class pentandria, order monogynia. Petals long, inserted into the calyx: capsule one-celled; two-valved. Two species—a Virginia shrub, and Carolina herb, both with alternate leaves, and white terminal racemes.

I'TEM. *ad.* (Latin.) Also. A word used when any article is added to the former.

I'TEM. *s.* 1. A new article (*Shakspeare*). 2. A hint; an inuendo (*Glanville*).

To I'TERATE. *v. a.* (*itero*, Latin.) 1. To repeat; to utter again; to inculcate by frequent mention (*Hooker*). 2. To do over again (*Milton*).

I'TERANT. *a.* (*iterans*, Latin.) Repeating (*Bacon*).

ITERA'TION. *s.* (*iteratio*, Latin.) Repetition; recital over again (*Hammond*).

ITHA'CA, in ancient geography, an island in the Ionian Sea, on the coast of Epirus: this was the country of Ulysses. It is about eight miles in circuit (though Pliny states it at 25); is now uninhabited, and called *Jathaco*.

ITI'NERANT. *a.* (*itinerant*, French.) Wandering; not settled (*Addison*).

ITI'NERARY. *a.* (*itinerarius*, Latin.) Travelling; done on a journey (*Bacon*).

ITI'NERARY, ITINERARIUM, a book of travels, or a journal or account of the distance of places. The most remarkable is that which goes under the names of *Antoninus* and *Æthicus*, or as Bartheus found in his copy, *Antoninus Æthicus*. *Itinerarium* denotes a day's march.

ITINERARY *Column*. See COLUMN.

ITSE'LF. *pronoun.* (*it* and *self.*) The neutral reciprocal pronoun applied to things.

I'TYS, in fabulous history, son of Tereus, king of Thrace, by Procne, daughter of Pandion, king of Athens, was killed by his mother when about six years old, and served up before his father. He was changed into a pheasant, his mother into a swallow, and his father into an owl.

ITZE'HOA, an ancient town of Lower Saxony, in the duchy of Holstein. Lat. 53. 58. N. Lon. 9. 38. E.

I'VA. In botany, a genus of the class syngenesia; order polygamia necessaria. Receptacle hairy; seeds naked, obtuse: Calyx three-leaved; florets of the ray five; styles two long. Four species:—all American plants—two shrubby, two herbaceous.

JUAN FERNANDEZ, an Island in the South Pacific Ocean, lying in 83. W. lon. and 33. S. lat. 300 miles W. of Chili. It is uninhabited, but having some good harbours, is found extremely convenient to touch at and water. Alexander Selkirk, a Scotchman, having been left on shore in this solitary place, by his captain, lived here some years, till he was discovered by Captain Rogers, in 1709. When brought on board he had forgotten his native language, and could scarcely be understood. He was dressed in goat skins, would drink nothing but water, and was some time before he could relish the ship's victuals. From this singular circumstance Daniel de Foe derived the hints which gave rise to his celebrated production, The Adventures of Robinson Crusoe.

JUAN DE LA FRONTERA, (ST.) a town of Chili, in South America. In its neighbourhood are gold mines. Lat. 33. 25. S. Lon. 68. 55. W.

JUAN DE PORTO RICO, one of the Caribbee Islands, in America. It is 100 miles long, and 50 broad, and belongs to the Spaniards. It produces sugar, rum, ginger, corn, and fruits. The island was taken by the Earl of Cumberland, in Queen Elizabeth's reign, but he was obliged to abandon it, on account of a dreadful sickness which raged among his men. Its capital town is of the same name. Lat. 18. 17. N. Long. 67. 4. W.

JUBA, a king of Numidia and Mauritania, who succeeded his father Hiempsal, and favoured the cause of Pompey against Julius Cæsar. He defeated Curio, whom Cæsar had sent to Africa, and after the battle of Pharsalia, he joined his forces to those of Scipio. He was conquered in a battle at Thapsus, and totally abandoned by his subjects. He killed himself with Petreius, who had shared his good fortune and his adversity. His kingdom became a Roman province, of which Sallust was the first governor. *Plut. Cæs.* &c.—The second of that name was the son of Juba the First. He was led

among the captives to Rome to adorn the triumph of Cæsar, but was afterwards, in consequence of his courteousness and fidelity, restored by Augustus to his father's dominions, and received in marriage Cleopatra, the daughter of Antony. Juba wrote a history of Rome in Greek, and also on the history of Arabia, and the Antiquities of Syria, &c.

JUBE, the name of a kind of hymn sung by the Greeks, and after them by the Romans, at harvest time, in honour of Ceres and Bacchus.

JU'BILANT. *a.* (*jubilans*, Latin.) Uttering songs of triumph (*Milton*).

JUBILA'TION. *s.* (*jubilation*, French; *jubilatio*, Lat.) The act of declaring triumph.

JUBILEE, among the Jews, denotes every fiftieth year; being that following the revolution of seven weeks of years; at which time all the slaves were made free, and all lands reverted to their ancient owners. The jubilees were not regarded after the Babylonish captivity. Some say, that *jobel* signifies a *ram*, and that the jubilee was thus called, because proclaimed with a ram's horn, in memory of the ram that appeared to Abraham in the thicket. Masius chooses to derive the word from *Jubal*, the first inventor of musical instruments, which, for that reason, were called by his name; whence the words *jobel* and *jubilee* came to signify the year of deliverance and remission, because proclaimed with the sound of one of those instruments, which at first was no more than the horn of a ram. Others derive *jobel* from יבל *jabal*, in hiphil הוביל, *hobil*, which signifies to recall or return; because this year restored all slaves to their liberty, &c. The institution of this festival is in Lev. xxv. 8. 17.

Jubilee, in a more modern sense, denotes a grand church solemnity or ceremony, celebrated at Rome, wherein the pope grants a plenary indulgence to all sinners; at least to as many as visit the churches of St. Peter and St. Paul at Rome.

The jubilee was first established by Boniface VII. in 1300, in favour of those who should go *ad limina apostolorum*; and it was only to return every hundred years. But the first celebration brought in such store of wealth to Rome, that the Germans called this the golden year; which occasioned Clement VI. in 1343, to reduce the period of the jubilee to fifty years. Urban VI. in 1389, appointed it to be held every thirty-five years, that being the age of our Saviour; and Paul II. and Sixtus IV. in 1475, brought it down to every twenty-five, that every person might have the benefit of it once in his life.

One of our kings, viz. Edward III. caused his birth-day to be observed in manner of a jubilee, when he became fifty years of age, in 1362. This he did by releasing prisoners, pardoning all offences except treason, making good laws, and granting many privileges to the people. The name of jubilee has also been applied to the fiftieth year of the *reign* of his present majesty George the Third.

JUCAT'AN, or Yucatan, a province of New Spain, in North America. It is unhealthy, by reason of frequent inundations. The English cut log-wood here.

JUCU'NDITY. *s.* (*jucunditas*, Latin.) Pleasantness; agreeableness (*Brown*).

JUDA'ISM, the religious doctrines and rites of the Jews. Judaism was but a temporary dispensation, and was to give way, at least the ceremonial part of it, at the coming of the Messias. For a complete system of Judaism, see the books of Moses. Judaism was anciently divided into several sects; the principal whereof were the Pharisees, Sadducees, and Essenians.

At present there are two sects among the Jews, viz. the Caraites, who admit of no rule of religion, but the law written by Moses; and the Rabbinists, who add to the law the traditions of the Talmud.

It has been observed, that Judaism, of all religions, is that which is the most rarely abjured.

To JUDAI'ZE. *v. n.* (*judaizo*, low Latin.) To conform to the manner of the Jews (*Sandys*).

JU'DAS Tree, in botany. See Cercis.

JUDAS Maccabeus, a celebrated general of the Jews, renowned for his many victories over his enemies, at last slain in battle 261 B. C. His exploits are recorded by Josephus in his History of the Jews.

JUDE (St.), an apostle of Christ, was called Lebbeus, Thaddeus, or the Zealous. He was the brother of St. James the Less, and preached the Gospel in Mesopotamia, Arabia, Syria, Idumea, and Libya. He is said to have suffered martyrdom at Berytus, A. D. 80. An epistle of his stands in the sacred canon as the last of the seven general epistles.

In the early ages of Christianity, several rejected this epistle, because the apocryphal books of Enoch, and the ascension of Moses, are quoted in it. Nevertheless it is to be found in all the ancient catalogues of the sacred writings; and Clement of Alexandria, Tertullian, and Origen, quote it as written by Jude, and reckon it among the books of sacred Scripture.

JUDEA, in ancient geography, taken largely, either denotes all Palestine, or the greater part of it. But in the New Testament, and in Josephus, it is often taken for the third part of Palestine on this side Jordan, and the southern part as distinct from Samaria and Galilee. It was bounded by Samaria, Jordan, and Lacus Asphaltites, Arabia Petræa, and the Mediterranean.

JUDENBURG, a considerable town of Germany, the capital of Upper Stiria, with a handsome castle. It is seated on the Muehr, Lat. 47. 10. N, Lon. 14. 26. E.

JUDGE. *s.* (*juge*, French; *judex*, Latin.) 1. One who is invested with authority to determine any cause or question, real or personal (*Milton*). 2. One who presides in a court of judicature (*Shakspeare*). 3. One who has skill sufficient to decide upon the merit of any thing (*Pope*).

To JUDGE. *v. a.* (*juger*, French.) 1. To pass sentence (*Genesis*). 2. To form or give an opinion (*Milton*). 3. To discern; to distinguish; to consider accurately (*Ad.*)

To JUDGE. *v. a.* 1. To pass sentence upon; to examine authoritatively: to determine finally (*Dryden*). 2. To pass severe censure; to doom severely (*Matthew*).

JU'DGER. *s.* (from *judge.*) One who forms judgment, or passes sentence (*Digby*).

JU'DGES, in England, are in number twelve, viz. the lords chief justices of the courts of King's Bench and Common Pleas; the lord chief baron of the Exchequer; the three puisne or inferior judges of the two former courts, and the three puisne barons of the latter.

By stat. 1 Geo. III. c. 23. the judges are to continue in their offices during their good behaviour, notwithstanding any demise of the crown (which was formerly held immediately to vacate their seats), and their full salaries are absolutely secured to them during the continuance of their commissions, by which means the judges are rendered completely independent of the king, his ministers, or his successors.

A judge at his creation takes an oath that he will serve the king, and indifferently administer justice to all men, without respect of persons, take no bribe, give no counsel where he is a party, nor deny right to any, though the king or any other, by letters, or by expressed words, command the contrary, &c. and in default of duty, to be answerable to the king in body, land, and goods.

Where a judge has an interest, neither he nor his deputy can determine a cause, or sit in court: and if he does, a prohibition lies. Hardw. 503.

Judges are punishable for wilful offences against the duty of their situations; instances of which happily live only in remembrance. There are ancient precedents of judges who were fined when they transgressed the laws, though commanded by warrants from the king.

JUDGES, *Book of*, a canonical book of the Old Testament, so called from its relating the state of the Israelites under the administration of many illustrious persons who were called judges, from being both the civil and military governors of the people, and who were raised up by God upon special occasions, after the death of Joshua, till the time of their making a king. In the time of this peculiar polity, there were several remarkable occurrences, which are recorded in this book. It acquaints us with the gross impiety of a new generation which sprung up after the death of Joshua; and gives us a short view of the dispensations of heaven towards this people, sometimes relieving and delivering them, and at others severely chastising them by the hands of their enemies.

JU'DGMENT, or JUDGEMENT. *s.* (*jugement*, French.) 1. The power of discerning the relations between one term or one proposition and another (*Locke*). 2. Doom; the right or power of passing judgment (*Shakspeare*). 3. The act of exercising judicature (*Addison*). 4. Determination; decision (*Burnet*). 5. The quality of distinguishing propriety and impropriety; criticism (*Dennis*). 6. Opinion; notion (*Shaks.*) 7. Sentence against a criminal (*Milton*). 8. Condemnation (*Tillotson*). 9. Punishment inflicted by Providence (*Addison*). 10. Distribution of justice (*Arbuthnot*). 11. Justiciary law; statute (*Deuteronomy*). 12. The last doom (*Shakspeare*).

JU'DGMENT, a faculty of the soul, by which it perceives the relation between two or more ideas.

Thus, when we judge that the sun is greater than the moon, the understanding first compares the two ideas of the sun and the moon; and, finding the idea of the sun greater than that of the moon, the will perfectly acquiesces in that perception, nor puts the mind upon any farther inquiry.

It is not the understanding then that judges, as is ordinarily thought; judgments and reasonings on the part of the understanding are but mere perceptions; it is the will alone that judges, by acquiescing in what is represented to it by the understanding.

The only difference then between perception, judgment, and reasoning, so far as the understanding is concerned in them, is this: that it perceives a thing simply, without any relation to any other thing, in a simple perception; that it perceives the relations between two or more things in judgments; and, lastly, that it perceives the relations that are between the relations of things in reasonings; so that all the operations of the understanding are in effect no more than pure perceptions.

Thus, when we perceive, for instance, twice 2, or 4, this is no more than a simple perception; when we judge that twice 2 are 4, or that twice 2 are not 5, the understanding does no more than barely perceive the relation of equality that is between twice 2 and 4, or of inequality between twice 2 and 5.

JU'DGMENT. The opinion of the judges is so called, and is the very voice and final doom of the law; and, therefore, is always taken for unquestionable truth; or it is the sentence of the law pronounced by the court upon the matter contained in the record. Judgments are of four sorts, viz. 1. Where the facts are confessed by the parties, and the law determined by the court, which is termed judgment by demurrer. 2. Where the law is admitted by the parties, and the

facts only are disputed, as in judgment upon a demurrer. 3. Where both the fact and the law arising thereon are admitted by the defendant, as in case of judgment by confession or default. 4. Where the plaintiff convinced that fact or law, or both, are insufficient to support his action, and therefore abandons or withdraws his prosecution, as in case of judgment upon a nonsuit or retraxit. See WARRANT of ATTORNEY.

Judgments are either interlocutory or final. Interlocutory judgments are such as are given in the middle of a cause, upon some plea, proceeding, or default, which is only intermediate, and doth not finally determine or complete the suit; as upon dilatory pleas, when the judgment in many cases is that the defendant shall answer over, that is, put in a more substantial plea. Final judgments are such as at once put an end to the action, by declaring that the plaintiff hath either entitled himself, or hath not, to recover the remedy he sues for.

JU'DGMENT OF ZEAL, among the Jews, a custom in conformity with which every private Israelite thought he had a right to put another to death on the spot, if he found him in a capital breach of the divine law: on this principle the Jews acted when they "sought to kill" our Lord, "because he not only had broken the sabbath, but said also that God was his father, making himself equal with God," John v. 18. On this principle also they acted when they stoned Stephen, Acts vii. 58. And again, "when they went about to kill Paul," Acts xxi. 32.

JU'DICATORY. *s.* (*judico*, Latin.) 1. Distribution of justice (*Clarendon*). 2. Court of justice (*Atterbury*).

JU'DICATURE. *s.* (*judicature*, French.) 1. Power of distributing justice (*Bacon*). 2. Court of justice (*South*).

JUDI'CIAL. *a.* (*judicium*, Latin.) 1. Practised in the distribution of public justice (*Bentley*). 2. Inflicted on as a penalty (*South*).

JUDI'CIALLY. *ad.* In the forms of legal justice (*Grew*).

JUDI'CIARY. *a.* (*judiciare*, French.) Passing judgment upon any thing (*Boyle*).

JUDI'CIOUS. *a.* (*judicieux*, French.) Prudent; wise; skilful (*Locke*).

JUDI'CIOUSLY. *ad.* Skilfully; wisely; with just determination (*Dryden*).

JUDI'CIUM DEI, Judgment of God, was a term anciently applied to all extraordinary trials of secret crimes; as those by arms, and single combat, and the ordeals; or those by fire, or red-hot plough-shares, by plunging the arm in boiling water, or the whole body in cold water; in hopes God would work a miracle, rather than suffer truth and innocence to perish.

Si super defendere non possit, *judicio Dei*, scil. aqua vel ferro, fieret de eo justitia.

These customs were a long time kept up, even among Christians; and they are still in use in some nations. See ORDEAL, WATER, COMBAT, DUEL, and CHAMPION.

Trials of this sort were usually held in churches, in presence of the bishops, priests, and secular judges; after three days fasting, confession, communion, and many adjurations and ceremonies, described at large by Du Cange.

JU'DICIUM *Parium* denotes a trial by a man's equals, *i. e.* of peers by peers, and of commoners by commoners. In Magna Charta it is more than once insisted on as the principal bulwark of our liberties, but especially by chap. 29. that no freeman shall be hurt in either his person or property, *nisi per legale* judicium *parium suorum vel per legem terræ.* And this was ever esteemed, in all countries, a privilege of the highest and most beneficial nature. See JURY.

IVES, or YVES, bishop of Chartres, was born in 1035, and raised to that see in 1073. He died in 1115. There are extant by him, 1. A Collection of Decrees; 2. Exceptiones Ecclesiasticarum Regularum; 3. Sermons, &c.

IVES, or *Vives*, a disease which has a near affinity to the strangles. See STRANGLES. It is a slight inflammation and inlargement of the glands under the ears of a horse. These seldom come to suppuration, however, as in the strangles, but wear off gradually, and the pain and soreness often abate, as in persons affected with the mumps, or when the almonds of their ears are said to be down. The disease is cured often only by keeping the part warm, and protected from the external cold. Sometimes the swelling of these glands continues for a week or a fortnight, and at last spreads downwards under the throat, and terminates in the strangles, and then it requires to be treated as such.

The ives, like the strangles, is most incident to young horses, and usually proceeds from the same causes, viz. their catching cold, being over-heated, or in any degree over-worked about the time of shedding their teeth, &c. A horse that has the ives rather coughs more and oftener than one that has only the strangles, and has a no less difficulty in swallowing, occasioned by the pain and tenderness of the glands, which in some is so sensible, that they can scarcely bear to be touched about the neck and throat; and, in some, the eyes appear swoln, tender, and watery. A fever, for the most part, also attends the ives, and this is often of the malignant kind. Some horses in this disease appear to be extremely sick, and for a short time refuse all manner of food. When it happens at the time of shedding their teeth, the gums will appear red and tumified all round their sockets. The lampas generally rise at the same time to a great degree, and reach beyond the edges of the upper teeth; all which concomitant symptoms excite pain, and make a horse very

uneasy. When the ives take place in a horse that is old or full-aged, Gibson says, it is a sign of great malignity, and often of inward decay, which, for the most part, proves dangerous, and therefore ought to be treated as other malignant distempers.

The ives in young horses requires a more simple treatment. The usual method of cure is, in the first place, to anoint the glands with ointment of marsh-mallows, and to cover the horse's head and neck with warm clothing. At the same time it is proper to bleed in proportion to the horse's strength, and repeat the bleeding in a day or two in a smaller quantity, if the fever continue violent; but if the glands inflame and swell, suppuration is to be promoted by frequent embrocations, and keeping the parts warm with poultices. When the swelling retires downwards under the jaws, then the case presents no difficulty, but must be treated as the strangles.

Internally, the same method is to be followed as in colds, and the same opening diet used till the horse recovers his appetite. Drinking water-gruel plentifully is a great help in all such cases, with scalded bran as a mash; in his bran may be given sulphur and honey with good effect, and an ounce of nitre should be mixed with it once a-day. As soon as he gets flesh, and has recovered his strength, it will be proper to give him one or two mild purges. Purging is also sometimes necessary after the strangles, especially in cases where the horse looks surfeited or hide-bound. This, however, seldom happens, except where there has been some previous ill habit, some bad management, or a more than ordinary malignity in the disorder; for, in most cases, the strangles are so kindly, that horses have been observed to thrive the better afterwards than before.

IVES, St. a sea-port town of Cornwall, in England, seated on a bay of the same name, which is chiefly frequented by fishermen, for the taking of pilchards. By this trade, and that of Cornish slates, it has thriven greatly, and twenty or thirty sail of ships now belong to it. It is a corporation, governed by a mayor, recorder, &c. and it sends two members to parliament. Here is a handsome spacious church, and a grammar-school, which was founded by Charles I. Lat. 50. 18. N. Lon. 5. 30. W.

Ives, *St.* is also the name of a town in Huntingdonshire, 64 miles from London, 5 from Huntingdon, and 12 from Cambridge. It has a fine strong bridge over the Ouse; a church with a lofty spire, and had in the ninth century a mint. Here is a very large market on Mondays for fatted cattle. Lat. 52. 20. N. Lon. 0. 20. W.

JU'G. *s.* (*jugge*, Danish) A large drinking vessel, with a gibbous or swelling belly (*Swift*).

JU'GALE OS. (*jugalis*, from *jugum*, a yoke, from its resemblance, or because it is articulated to the bone of the upper jaw like a yoke.) *Os malæ. Os zygomaticum.* The ossa malarum are the prominent square bones which form the upper part of the cheeks. They are situated close under the eyes, and make part of the orbits. Each of these bones has three surfaces to be considered. One of these is exterior and somewhat convex. The second is superior and concave, serving to form the lower and lateral parts of the orbit. The third, which is posterior, is very unequal, and concave, for the lodgment of the lower part of the temporal muscle. Each of these bones may be described as having four processes, formed by their four angles. Two of these may be called orbitar processes. The superior one is connected with the orbitar process of the os frontis; and the inferior one with the malar process of the maxillary bone. The third is connected with the temporal process of the sphenoid bone; and the fourth forms a bony arch, by its connexion with the zygomatic process of the temporal bone. In infants these bones are entire and completely ossified.

To JU'GGLE. *v. n.* (*jougler*, French.) 1. To play tricks by slight of hand (*Digby*). 2. To practise artifice or imposture (*Shaks.*)

JU'GGLE. *s.* (from the verb.) 1. A trick by legerdemain. 2. An imposture; a deception (*Tillotson*).

JU'GGLERS are a kind of people whose profession has not been often deemed either respectable or useful. Professor Beckmann, however, has undertaken their defence; and in a long and learned chapter in the third volume of his History of Inventions, pleads the cause of the practisers of legerdemain; rope-dancers; persons who place their bodies in positions apparently dangerous; and of those who exhibit feats of uncommon strength. All these men he classes under the general denomination of Jugglers; and taking it for granted (surely upon no good grounds) that every useful employment is full, he contends, that there would not be room on the earth for all its present inhabitants, did not some of them practice the arts of juggling.

Our author, however, proves in a very learned manner, that all these tricks were of high antiquity: that the Hirpi, who lived near Rome, jumped through burning coals; that women were accustomed to walk over burning coals at Castabala in Cappadocia, near the temple dedicated to Diana; that the exhibition of balls and cups (see Legerdemain) is often mentioned in the works of the ancients; that in the third century, one Firmus, or Firmius, who endeavoured to make himself emperor in Egypt, suffered a smith to forge iron on an anvil placed on his breast; that rope-dancers with balancing poles are mentioned by Petronius and others; and that the various feats of horsemanship

exhibited in our circuses passed, in the thirteenth century, from Egypt to the Byzantine court, and thence over all Europe.

JU'GGLINGLY. *ad.* (from *juggle.*) In a deceptive manner.

JUGLA'NS. (*juglans, dis,* f. *quasi Jovis glans*, the royal fruit, from its magnitude.) The walnut. In botany a genus of the class and order monœcia polyandria. Male: calyx one-leafed, scale-form; corol six-parted; filaments from twelve to twenty-four. Female: four-cleft, superior; corol four-parted; styles two; drupe with a grooved nut. Eight species—all American trees except one. The two following are chiefly known in England:

1. I. Alba. Hickery. Leaflets seven, lanceolate, serrate; odd one sessile. A native of North America.

2. I. Regia. Common walnut. Leaflets about nine, oval or oblong, glabrous, slightly serrate, nearly equal; the one petioled. A native of Persia. In its cultivated state among ourselves it exhibits several varieties, as the larger, the thin-shelled, the French walnut. They are all easily propagated from the nut; but the variety cannot be depended upon: and hence it is better to purchase them of the nurserymen when under fruit, that no disappointment may be experienced. The unripe fruit, which has an astringent bitterish taste, and has been long employed as a pickle, is directed for medicinal use by the London College, on account of its anthelmintic virtues. An extract of the green fruit is the most convenient preparation, as it may be kept for a sufficient length of time, and made agreeable to the stomach of the patient by mixing it with cinnamon water.

JUGO'RA, a province of Muscovy, depending on the government of Archangel.

JU'GULAR. *a.* (*jugulum*, Lat.) Belonging to the throat (*Wiseman*).

Ju'gular Fishes. In zoology the second order of the Linnean class Pisces: characterised by having the ventral fins before the pectoral, and the gills bony. See Pisces and Zoology.

Ju'gular Veins, (*Venæ jugulares* from *jugulum*, the throat.) These veins run from the head down the sides of the neck, and are divided, from their situation, into external and internal. The external or superficial jugular vein receives the blood from the frontal, angular, temporal, auricular, sublingual or ranine, and the occipital veins. The internal or deep-seated jugular vein receives the blood from the lateral sinusses of the dura mater, the laryngeal and pharyngeal veins. Both jugulars unite, and form with the subclavian vein, the superior vena cava, which terminates in the superior part of the right auricle of the heart.

JUGUM. In botany, a yoke, couple, or pair of leaflets. Hence *folium conjugatum*, a leaf paired or having one pair of leaflets, of which there are many instances in the class Diadelphia.

Jugum, an humiliating mode of punishment inflicted by the victorious Romans upon their vanquished enemies. It was thus. They set up two spears, and laying a third across, in the form of a gallows, they ordered those who had surrendered themselves to pass under this ignominious erection, without arms or belts. None suffered the disgrace of passing *sub jugo* but such as had been obliged to surrender.

JUGURTHA, the illegitimate son of Manastabal, the brother of Micipsa. Micipsa and Manastabal were the sons of Masinissa, king of Numidia. Micipsa, who had inherited his father's kingdom, educated his nephew with his two sons, Adherbal and Hiempsal; but, as he was of an aspiring disposition, he sent him with a body of troops to the assistance of Scipio, who was besieging Numantia, hoping to lose a youth whose ambition seemed to threaten the tranquillity of his children. His hopes were frustrated, Jugurtha showed himself brave and active, and endeared himself to the Roman general. Micipsa appointed him successor to his kingdom with his two sons, but this kindness of the father proved fatal to the children. Jugurtha destroyed Hiempsal, stripped Adherbal of his possessions, and obliged him to fly to Rome. The Romans listened to the complaints of Adherbal, but Jugurtha's gold prevailed among the senators. Cæcilius Metellus was at last sent against Jugurtha, and his firmness soon obliged him to fly among his savage neighbours for support. Marius and Sylla succeeded Metellus, and fought with equal success. Jugurtha was at last betrayed by his father-in-law Bocchus, and was delivered into the hands of Sylla, after a war of five years. He was exposed to the view of the Roman people, and dragged in chains to adorn the triumph of Marius. He was afterwards put in a prison, where he died six days after of hunger, B. C. 106.

IVICA, an island of the Mediterranean, 56 miles S. W. of Majorca. It is about 60 miles in circuit. It is mountainous, but fertile in corn, wines, and fruits; and is remarkable for great quantities of salt. The capital is of the same name, and has a good harbour. Lat. 38. 52. N. Lon. 1. 25. E.

JUICE. *s.* (*jus*, French.) 1. The liquor, sap, or water of plants and fruits (*Watts*). 2. The fluid in animal bodies (*Ben Jonson*).

JU'ICELESS. *a.* (from *juice.*) Dry; without moisture (*More*).

JUI'CINESS. *s.* (from *juice.*) Plenty of juice; succulence.

JUI'CY. *a.* (from *juice.*) Moist; full of juice; succulent (*Milton*).

JUJUBE Tree. See Zizyphus.

JUJUBES. See Jujubæ and Rhamnus.

JUJUBŒ. (*Arab.*) Jujubes. A half-dried

fruit of the plum kind, about the size and shape of an olive, the produce of the Rhammes zizyphus of Linnéus. Jujubes, when in perfection, have an agreeable sweet taste, and in the southern parts of Europe, where they are common, make an article of food in their recent state, and of medicine when half dried.

IRINGHO, a town in Buckinghamshire, with a market on Fridays. Lat. 51. 54. W. Lon. 0. 35. W.

To JUKE. *v. n.* (*jucher*, Fr.) To perch upon any thing as birds.

JUL, or Jol, a Gothic word, signifying a "sumptuous treat;" and particularly applied to a religious festival, first among the heathens, and afterwards among Christians. By the latter it was given to Christmas; which is still known under the name of Jul, or Yool, in Denmark, Norway, Iceland, and Sweden; nay, even in the north of Britain; and whence the month of Januarius by the Saxons was styled *Giuli*, i.e. "the Festival." As this feast had originally been dedicated by our heathen ancestors to the Sun, their supreme deity; so the Christians, for the purpose of engaging the minds of their Ethnic (gentile) brethren, ordered it should be celebrated in memory of the birth of Christ: and thus it has been through ages a feast of joy and entertainment. We are indebted to Procopius for the first account of this feast.

JULAP, (*gulab Arab.*) A julep or sweet liquid medicine.

JULIAN, the Roman emperor, surnamed the Apostate, was the younger son of Constantius, brother of Constantine the Great, and was born in 331 at Constantinople. His education was liberal, and he made an open and rather zealous profession of christianity, till his accession to the imperial throne on the death of Constantius his cousin in 361. He was no sooner become his own master than he threw off the mask, and made a public avowal of paganism; and though he did not directly persecute the christians, yet he endeavoured all in his power to root out their religion. He stigmatized the followers of Jesus by the nick-name of Galileans, wrote several books against christianity, and connived at the cruelties which some of his governors committed on their persons. He also caressed the Jews, and promised to rebuild Jerusalem, and to make it the imperial residence, by way of confuting the prophecies of our Saviour. He accordingly set about building the temple, but the design was defeated by the destruction of the workmen, who were assaulted by balls of fire issuing from the foundations. When this happened Julian was at Antioch on an expedition against the Persians, in which he was at first successful, but after several partial engagements a general battle took place June 26, 363, wherein Julian was mortally wounded and died the ensuing night. Julian was a man of great talents, but strangely *bigoted* to the religion of paganism. His works were published by Spanheim in 2 vols. folio, 1626.

The works of Julian furnish us with another instance in which the cause of divine truth may be served by the attempts of an adversary to injure it. Julian, who seemed desirous to say something that might render the divinity of our Lord suspected, argues that neither Matthew, Mark, Luke nor Paul himself, ever presumed to call him God; but that it was St. John who talked after this manner. He says that "John perceiving how the persuasion of Christ's being God, prevailed mightily among the christians dispersed through many cities of Greece and Italy, did then take upon him to assert the same doctrine in his gospel, with a view to humour them, and to get himself reputation," (Julian apud Cyril. L. 10. p. 327. Edit. Lips.) Here then, we have a plain confession from a vehement adversary; a confession which (ridicule and banter apart) amounts to this; that the generality of christians, as early as the apostolic age, were exceedingly zealous for the doctrine of Christ's divinity, and that St. John himself commended them for it, encouraged them in it, and wrote his gospel to confirm it. Since he could not disown the *fact*, he endeavoured in his ludicrous way, to turn the whole into ridicule. Now, how wrong soever he was in his observations, yet his *concession* deserves particular notice. He not only acknowledges the divinity of our Lord as a prevalent doctrine in the apostolic times; but he lets us know that he took those writings which in his time bore the names of Matthew, Mark, Luke, John, Paul, to be the genuine productions of those authors. Hence, he was certainly very sensible that the evidences for the genuineness of these books, were at that period so very clear and convincing, that it would have been perfectly scandalous for any one to have called them in question: otherwise he would have attacked the christians after another manner, and instead of citing these books in so tame and innocent a way as he has done in the passage we above refer to, he would have exposed them as so many pieces of shameful imposture, and the christians as the worst of fools for thinking otherwise. See Celsus.

JULIAN *Calendar*, is that depending on, and connected with the Julian year and account of time; so called from Julius Cæsar, by whom it was established. See Calendar.

Julian *Epoch*, is that of the institution of the Julian reformation of the calendar, which began the 46th year before Christ.

Julian *Period*, is a cycle of 7980 consecutive years, invented by Julius Scaliger, from whom it was named, though some say his name was Joseph Scaliger, and that it was called the Julian Period, because he made use of Julian years. This period is formed by multiplying continually together the three following cycles, viz.

that of the sun of 28 years, that of the moon of 19 years, and that of the indiction of 15 years; so that this epoch, although but artificial or feigned, is yet of good use; in that every year within the period is distinguishable by a certain peculiar character; for the year of the sun, moon, and indiction, will not be the same again till the whole 7980 years have revolved. Scaliger fixed the beginning of this period 764 years before the creation, or rather the period naturally reduces to that year, taking the numbers of the three given cycles as he then found them; and accounting 3950 years from the creation to the birth of Christ, this makes the 1st year of the Christian era answer to the 4714th year of the Julian period; therefore, to find the year of this period, answering to any proposed year of Christ, to the constant number 4713, add the given year of Christ, and the sum will be the year of the Julian period: thus, to 4713 adding 1791, the sum 6504 is the year of this period for the year of Christ 1791. Hence the first revolution of the Julian period will not be completed till the year of Christ 3267, after which a new revolution of this period will commence.

But the year of this period may be found for any time, from the numbers of the three cycles that compose it, without making use of the given year of Christ, thus multiply the numbers $\left\{\begin{matrix}4845\\4200\\6916\end{matrix}\right\}$ respectively by the year of the $\left.\begin{matrix}\text{sun,}\\\text{moon,}\\\text{indiction}\end{matrix}\right\}$ then add the three products together, and divide the sum by 7980, so shall the remainder after division be the year of the Julian period corresponding to the given years of the other three cycles.

Julian *Year*, is the old account of the year, established by Julius Cæsar, and consisted of 365¼ days. This year continued in use in all Europe till it was superseded in most parts by the new or Gregorian account, in the year 1582. In England however it continued to be used till the year 1752. See Bissextile.

JULIEN, St. a town of France, in the department of Upper Vienne, Lat. 45. 50. N. Lon. 1. 4. E.

JULIERS, a duchy of Westphalia, 68 miles long, and 30 broad; bounded on the N. by Guelderland, on the E. by the archbishopric of Cologne, on the S. by Luxemburg and Treves, and on the W. by Limburg. It is subject to the elector palatine.

Juliers, a town of Germany, capital of a duchy of the same name, with a strong citadel. It is seated on the Roer, 15 miles E. of Aix-la-Chapelle. Lat. 50. 56. N. Lon. 6. 40. E.

JULIUS CÆSAR. See Cæsar.

IULUS. In botany a Catkin or Ament. For this term of Tournefort's and others, Linnéus substituted Amentum. Hence Herman and others had a class of trees entitled juliferæ.

Iulus. In Zoology a genus of the class insecta and order aptera. Lip crenate, emarginate; antennas moniliform; feelers two, filiform; body long, semi-cylindrical, consisting of numerous, transverse segments; legs numerous, twice as many on each side as there are segments of the body. Fourteen species, scattered over the globe; of which four are common to our own country. Some inhabit nuts. Some are found under stones, others in the earth. The whole tribe, however, so nearly resembles the oniscus as to be included under one genus in the fauna suecica. The following are the chief.

1. I. Sabulosus. An hundred and twenty legs on each side; body livid; glabrous, and of ash-colour; antennas short, and consisting of five rings. When the animal is touched it wraps itself up into a round ball, the feet all turned inwards: length about an inch and a quarter; often found in the soft mould of hollow trees.

2. I. Indus. Great Indian Iulus. Six or seven inches long; colour and general structure like the preceding: found in the warmer parts of Asia and America, inhabiting woods and other retired spots; legs a hundred and fifteen on each side.

3. I. Lagurus. Hare-tailed Iulus. Very minute; not exceeding, when full grown the eighth of an inch in length; colour pale brown; shape broad and flattish; body consisting of eight segments, each fringed with whitish hairs; head large; tail furnished with two milk-white plumes or tufts. Found in the summer about the bark of trees, walls, &c. Linnéus considered it as a *centiped* or species of scolopendra; but its legs are too numerous for this arrangement.

4. I. Maximus. This is the largest of all the iuli, being as long and as thick as a man's finger. The head is small, and obtuse, antennas clavate, eyes black; body of a pale colour, and divided into forty-three segments, each having a pair of feet on either side, the whole amounting to an hundred and seventy-two. This last species is taken from a drawing of Pere Plumier, as given by Dr. Lister, who affirms it to be a native of South America. In Seba it occurs under the name of Millepeda orientalis, omnium maxima.

JULY, the 7th month of the year, consisting of 31 days; about the 21st of which the sun usually enters the sign ♌ leo. This month was so named by Mark Antony, from Julius Cæsar, who was born in this month.

July-Flower. *Clove: Queen: Stock.* See Dianthus, Hesperis, and Cheiranthus.

JU'MART, *s.* (French.) The mixture of a bull and a mare (*Locke*).

To JU'MBLE, *v. a.* To mix violently and confusedly together (*Locke*).

To Ju'mble, *v. n.* To be agitated together (*Swift*).

JU'MBLE, *s.* (from the verb.) Confused mixture; violent and confused agitation. (*Swift*).

JU'MENT, *s.* (*jument* Fr.) Beasts of burden (*Brown*).

JUMIEGE, a town of France, in the department of Lower Seine, with a late celebrated Benedictine Abbey. Lat. 49. 24. N. Lon. 0. 55. E.

JUMNA, a river of Hindoostan Proper, which rises to the N. W. of Delhi, and joins the Ganges 100 miles below Benares.

To JUMP, *v. a.* (*gumpen* Dutch.) 1. To leap; to skip; to move without step or sliding (*Swift*). 2. To leap suddenly (*Collier*). 3. To jolt (*Nahum*). 4. To agree; totally; to join (*Hakewill*).

To Jump. *v. n.* To pass by a leap; to pass eagerly or carelesly over (*Shakspeare*).

Jump. *ad.* Exactly; nicely: obsolete (*Shakspeare*).

Jump. *s.* (from the verb). 1. The act of jumping; a leap; a skip; a bound (*Locke*). 2. A lucky chance (*Shakespeare*). 3. (*jupe* French.) A waistcoat; a kind of limber stays worn by sickly ladies (*Cleveland*).

JU'NCATE. *s.* (*juncade*, French). 1. Cheesecake; a kind of sweetmeat of curds and sugar. 2. Any delicacy (*Milton*). 3. A furtive or private entertainment: now improperly written *junket*.

JU'NCOUS. *a.* (*junceous*, Latin.) Full of bulrushes.

JU'NCTION. *s.* (*junction*, French.) Union; coalition (*Addison*).

JU'NCTURE. *s.* (*juncture* Latin.) 1. The line at which two things are joined together (*Boyle*). 2. Joint; articulation (*Hale*). 3. Union; amity (*K. Charles*). 4. A critical point or article of time (*Addison*).

JUNCUS. Rush, in botany a genus of the class hexandria, order monogynia. Calyx six-leaved, permanent; corolless; capsule superior, three-valved, one or three-celled; seeds numerous; stigma, three. Forty-one species, mostly natives of Europe, nineteen common to the marshes, bogs, and wet pastures of our own country; several indigenous to America; a few to the Cape. Of the different species, nearly half have naked, the rest leafy, culms. The whole are generally regarded as weeds; yet in many countries, and especially in Holland, several species, are regularly mown, tied up in bundles, and employed as fuel. A few of them are of still higher and very considerable value: as giving, by their growth, tenacity to the banks of rivers, so as considerably to retard the encroachments of a rapid current; as affording a useful and pleasant matting for floors and chairs; and especially as furnishing, from their pith, a wick for the very valuable night-candle called rush-light. Of this useful tribe of juncus the three most common species are.

1. I. Conglomeratus. Conglomerate rush. Culm naked, stiff; panicle lateral, conglobate; capsule, retuse; stamens three.

2. I. effusus. Spreading rush. Culm, naked, stiff; panicle lateral, effuse; more than decompound; capsules obtuse.

3. I. acutus. Sea-rush. Culm naked, round, panicle terminal; involucra, two-leaved, spinous, capsules roundish, mucronate.

Of these the first two are found wild in our wet pastures; the last on our sea-coasts.

Juncus odoratus. *Fœnum camelorum. Juncus aromaticus.* Camel hay. Sweet rush. This dried plant, *Andropogon schænanthus* of Linnéus, is imported into this country from Turkey and Arabia. It has an agreeable smell, and a warm, bitterish, not unpleasant taste. It was formerly employed as a stomachic and deobstruent. See Andropogon.

JUNE, the 6th month of the year; during which the sun enters the sign ♋ Cancer, at the time of the summer solstice. It contains 30 days. The word comes from the Latin *Junius*, which some derive *à Junone*.

JUNGERMA'NNIA. In botany, a genus of the class cryptogamia, order hepatica. Male: flowers sessile. Fem: capsule peduncled, naked, arising from a sheath, four valved; seeds attached to elastic filaments. Eighty-eight species, of which fifty are indigenous to the woods, shades and ditches of our own country.

They may be thus arranged.

A Caulescent: branches compound, pinnate.

B Caulescent: fronds pinnate, or nearly so.

C Caulescent: fronds imbricate.

This embraces by far the largest section.

D Stemless: of which there are not more than eleven species.

JUNGIA. In botany, a genus of the class syngenesia, order polygamia segregata. Receptacle chaffy, down feathery, calyx three or four flowered; florets all hermaphrodite, tubular, two-lipped; outer lip ligulate, inner-lip two parted. One species only, a native of South America, with terminal panicle.

JUNGLE, in Bengal, waste land, or land covered with wood, brambles, &c.

JU'NIOR. *a.* (*junior*, Latin.) One younger than another (*Swift*).

JU'NIPER. See Juniperus.

Ju'niper gum. See Sandarack.

JU'NIPERUS. Juniper. In botany, a genus of the class diœcia, order monadelphia. Male: calyx the scales of an ament; corolless; stigmas three. Fem: calyx scales of an ament, fewer, becoming fleshy, uniting into a three seeded berry. Twelve species; chiefly natives of the south of Europe, a few of Asia, and America. The following are the chief.

1. J. communis. Common Juniper. Leaves in threes, spreading, spinous-mucronate, longer than the berries. A native of the mountains of our own country: the tops and berries of which are directed in our pharmacopoeias, but the latter are usually preferred, and are brought chiefly from Holland and Italy. Of their efficacy as a stomachic, carminative, diaphoretic, and diuretic, there are several relations by physicians of great

authority: and medical writers have also spoken of the utility of the juniper in nephritic cases, uterine obstructions, scorbutic affections, and some cutaneous diseases. Our pharmacopoeias direct the essential oil, and a spirituous distillation of the berries, to be kept in the shops.

The resinous tears wept by this tree are called Sandarac or Sandrac, and, when pounded, pounce, which is used as a preventative of blotting on writing paper.

2. J. Sabina. Savin. Leaves opposite, erect, decurrent; the oppositions closed. A native of the South of Europe. It affords several varieties.

3. J. Virginiana. Red Cedar. Virginian Cedar. Leaves ternate, fixed by the base; the younger ones imbricate; older ones spreading. A native tree of North America, growing thirty or forty feet high, and branching pyramidally from the sort to the summit.

4. J. Thurifera. Frankincense Juniper. Leaves imbricate in four rows, acute, with large berries of a black hue when ripe. From this and several other species is obtained the frankincense of the shops. The tree reaches about twenty feet in height, and is a native of the South of Europe.

5. J. Lycia. Leaves ternate, every where imbricate, ovate, obtuse. A native of the South of Europe, about twenty feet high. It is from this species chiefly that the gum called Olibanum exudes.

All the species may be easily propagated by seeds; but the Savins are more generally increased by cuttings and layers.

JUNIUS (Adrian), a learned Dutchman, was born at Hoorn in 1511. He studied physic, and took his doctor's degree at Bologna, after which he went to England, where he wrote several works, and among the rest a Greek and Latin lexicon, which he dedicated to king Edward VI. He afterwards returned to his own country, where he practised physic, but settled at last at Middleburgh, and died there in 1575. He was an able physician and good poet, and a man of extensive learning. His works are numerous.

Junius (Francis), professor of divinity at Leyden, was born at Bourges in 1545. He studied theology at Geneva, and in 1565 became minister of the Walloon church at Antwerp, from whence he was obliged to remove, owing to the contests between the papists and protestants. He afterwards became chaplain to the prince of Orange, and having resided at different places and filled several stations, settled at Leyden, where he died of the plague in 1602. His works are numerous, but what he is chiefly known by, is a Latin version of the Bible with notes, performed in conjunction with Tremellius.

Junius (Francis), son of the preceding, was born at Heldenburg in 1589. In 1620 he visited England, and was taken into the family of Thomas earl of Arundel. Here he studied the northern languages, in which he acquired an uncommon skill. He died at Windsor in 1677, and left his MSS. to the public library at Oxford. His works are, 1. Glossarium Gothicum; 2. De Pictura Veterum 1637; this book he afterwards published in English; 3. Observationes in Willerami Francicam paraphrasin Cantici Canticorum. His Etymologicon Anglicanum was published in 1743 in folio.

JUNK, in sea language, a name given to any remnants or pieces of old cable, which are usually cut into small portions, for the purpose of making points, matts, sennit, &c.

Junk, is also the name of a small Chinese ship.

JU'NKET. *s.* (properly *juncate.*) 1. A sweatmeat (*Shakspeare*). 2. A stolen entertainment.

To JU'NKET. *v. a.* (from the noun.) 1. To feast secretly; to make entertaiments by stealth (*Swift*). 2. To feast (*South*).

JU'NKSCILAN, a fertile island in the Indian ocean, near the S. W. coast of Siam. The principal town is of the same name, and situate on the N. part of the island, with a good harbour. Lat. 8. 40. N. Lon. 98. 30. E.

JUNO, in Pagan worship, the sister and wife of Jupiter, and the goddess of kingdoms and riches; she is also styled the queen of heaven; she presided over marriage and child-birth, and was represented as the daughter of Saturn and Rhea. She married Jupiter; but was not the most complaisant wife; for that god was sometimes obliged to make use of all his authority to keep her in due subjection; and Homer observes, that on her entering into a conspiracy against him, he punished her by suspending her in the air with two anvils fastened to her feet, and golden manacles in her hands, which all the other deities looked on without a possibility of helping her. However, her jealousy made her frequently find opportunities of interrupting her husband in the course of his amours, and prompted her to punish with unrelenting fury Europa, Semele, Io, Latona, and the rest of Jupiter's mistresses. Jupiter himself having conceived, without any commerce with a female, Juno, in revenge, conceived Vulcan by the wind; Mars by touching a flower, pointed out to her by the goddess Flora; and Hebe by eating greedily of lettuces. Juno, as the queen of heaven, preserved great state: her usual attendants were terror and boldness, Castor, Pollux, and 14 nymphs; but her most faithful attendant was the beautiful Iris, or the rainbow. Homer describes her in a chariot, adorned with precious stones; the wheels of which were of ebony, and which was drawn by horses with reins of gold. But she is more commonly painted drawn by peacocks. She was represented in her temple at Corinth, seated on a throne, with a crown on her head, a pomegranate in one hand, and in

the other a sceptre, with a cuckoo on its top. This statue was of gold and ivory.

Poets have given many epithets to Juno, calling her Lucina, Opigena, Juga, Domeduca, Cinxia, Unxia, Fluonia.

She was called Lucina, à Luce, because she helped women to bring forth children, and show them the light: and for the same reason she was also named Opigena and Obstetrix, because she helped women in labour.

JUNO was called Juga, because she presided at the yoke of matrimony, and consequently over the union of husband and wife, and because of that qualification, she had an altar erected to her in one of the streets of Rome, therefore called Vicus Jugarius, the street of yokes.

Domiduca, because she brought the bride to the house of her bridegroom.

Unxia, because of the bride's anointing the side posts of the door of her husband going in thereat.

Cinxia, because she helped the bridegroom to unite the girdle the bride was girded with; in fine she was called,

Fluonia, because she stopped the flux of blood in women's labours.

In one word, Juno was like a guardian angel to women, in the like manner that god genii was the keeper of men; for according to the opinion of the ancients, the genii of men were males, and those of women females: wherefore women swore by Juno, and men by Jupiter.

Juno, in astronomy, the name given to the small planet discovered by M. Harding, at Lilienthal, on September 1, 1804. It is situated between Pallas and Jupiter. For the principal elements of the orbit of this planet, see our article Astronomy. Its apparent diameter is 2½ seconds according to Lalande, Herschel assigns it at much less. Its real diameter Lalande says is about 1550 miles.

JUNONIA, certain feasts celebrated in honour of Juno, at which time the maids of all ages ran races, and petitioned her to give them husbands; at Rome an altar was erected to her as the goddess of marriage, where the new-married couple offered either a white cow, geese, or ravens, from which they took the gall before they sacrificed, and threw behind the altar, to intimate that in that state no bitterness of spirit shall remain.

JUNTA, Junto, or Juncto (*juncti*, Latin, whence *junta*, Spanish; a meeting or assembly.) in matters of government, denotes a select council for taking cognizance of affairs of great consequence, which require secrecy.

Hence the word is used to signify any cabal, or number of men combined to promote any secret design.

IVORY, a hard, solid, and firm substance, of a white colour, and capable of a very good polish. It is the tusk of the elephant, and is hollow from the base to a certain height. It is brought to us from the East Indies, and from the coast of Guinea. Tusks are valuable in proportion to their size; and it is observed, that the Ceylon ivory, and that from the island of Achem, do not become yellow by wear, as all other ivory does: hence the teeth of these places bear a larger price than those of the coast of Guinea.

Ivory-black, is prepared from ivory, or bones burnt in a close vessel. This, when finely ground, forms a more beautiful and deeper colour than lamp-black; but, in the common methods of manufacturing, it is apt to be adulterated with charcoal dust, so as to be almost, or altogether, unfit for use. See Lampblack.

Ivory-coast, a name given to a country of Africa, situated on the coast of the Atlantic, between Cape Apollonia and Cape Palmas, containing several towns, which are situated at the mouths of rivers called by the same name. The interior country is but little known, the natives refusing the Europeans leave to build settlements, or even to trade amongst them, except by means of the coast negroes, and even this with the most circumspect caution. The chief commodities are gold, ivory, and slaves, the former in the greatest plenty, but no regular tariff, or table, of the different proportions of each was ever settled. The inhabitants of this district have the reputation of being the most savage and barbarous on the whole coast; and some writers scruple not to call them anthropophagi. Barbot advises mariners to touch with caution on this shore; the natives, says he, bring on board some beautiful ivory, as a bait to draw the seamen on shore, and, perhaps, to devour them. This is the more probable, from their keeping their goods at so high a price, as will assuredly ever prevent Europeans from purchasing them, although they ask for every thing they see, and are greatly incensed if they meet with a refusal. Their suspicion and jealousy are predominant qualities; insomuch, that, on the least noise, they will precipitate themselves headlong into the sea, and swim to the canoes: for many of them have been carried off by European traders. Whatever the Gold Coast produces, is also found here in greater abundance and perfection, and, indeed, the fruits and vegetables of the warmer climates seem all to be united on the Ivory Coast.

JUPITER, in Pagan worship, the father of gods and men, and the greatest of all their deities, was the son of Saturn and Rhea. That goddess perceiving her husband devoured her children as fast as she brought them forth, and being in pain for Jupiter, she substituted a stone in his room, which Saturn immediately swallowed. He was educated by the sound of the instruments of the Corybantes. Virgil tells us, that he was fed by the bees, out of gratitude for which he changed them from an iron

to a golden colour. Some say, that his nurses were Amalthæa and Melissa, who gave him goat's milk and honey; and others, that Amalthæa was the name of the goat who nourished him, and which as a reward for her great services was changed into a constellation. According to others, he was fed by wild pigeons, who brought him ambrosia from Oceanus; and by an eagle who carried nectar in his beak from a steep rock; for which he rewarded the former by making them the foretellers of winter and summer, and the last by giving him immortality, and appointing him his thunder-bearer. When grown up, he defeated the Titans, dethroned his father Saturn, and divided his kingdom with his two brothers; Jupiter had the earth, Neptune the sea, and Pluto hell. Jupiter had several wives, the first of which, named Metis, he is said to have devoured when big with child, by which he himself became pregnant, and Minerva issued out of his head, completely armed and fully grown. His second was Themis; the name of his third is not known; his fourth was the celebrated Juno, whom he deceived under the form of a cuckoo, who to shun the violence of a storm fled for shelter to her lap. He was the father of the Muses and Graces; and had a prodigious number of children by his mistresses. He metamorphosed himself into a satyr to enjoy Antiope; into a bull to carry off Europa; into a swan to abuse Leda; into a shower of gold to corrupt Danae; and into several other forms to gratify his passions. He had Bacchus by Semele, Pallas by Thetis, Diana and Apollo by Latona, and was the father of Mercury, and the other gods.

The inhabitants of almost every nation had their Jupiter, called by several names; but the Greeks and Romans called the Sovereign God of each nation by the name of Jupiter. Pliny, speaking of the god of the Ethiopians in Africa, called Assabinus, says that he was esteemed to be Jupiter.

Osiris, the most famous king of Egypt, ranked in the number of gods, was also known by the name of Jupiter; as is recorded by Diodorus Siculus.

The Phœnicians had their Belus, or the sun, whom the Greeks called Jupiter, as Eusebius reports. Dagon, the god of the Phœnicians of the city of Azotus, was called by the husbandmen Jupiter, because he had taught them how to manure the ground, and cultivate wheat. "Dagon quod frumentum & aratrum invenisset, nuncupatus est Jupiter Aratrius." Jupiter the son of Neptune was a god of the Sidonians, called Maritimus, because this people was wholly given to navigation.

Stephanus assures us, that the same who was called Marnas at Gaza, was named Jupiter at Crete, for Marnas or Maranasin in the Phœnician language, signify king of men.

There was a Jupiter Belus amongst the Babylonians, and a Jupiter Indiges amongst the Latins, which shews, that what Varro affirms, as Tertullian relates in his Apologetic, is true, that there were three hundred Jupiters, i. e. three hundred kings, and kings fathers, who called themselves Jupiter, to immortalize their name, and obtain divine honours.

Notwithstanding it must be granted that the Jupiter of Crete, the father of Minos, was one of the most famous, and most ancient Jupiters of the West. Callimachus the poet, and his Scholiasts have written, that Minos having been buried in that island, with this inscription, "that he was the son of Jupiter;" the name of Minos was put out, and that of Jupiter left. Wherefore the inhabitants of Crete said, that they had the sepulchre of Jupiter.

The Dactyli of Mount Ida, the Curetes and Corybants, were ascribed to this Jupiter, because they had taken care of his education.

Jupiter Ammon was also very famous, and was represented with a ram's head, because of his intricate oracles, if we believe Servius. Herodotus gives us a better reason for the same, when he says that the Ammonites had that worship from the Egyptians, who inhabited the city of Thebes, where Jupiter was represented with a ram's-head.

Jupiter Ammon was a king of Egypt, ranked by the Egyptians in the number of gods, and adored in the most remote provinces. Diodorus Siculus reporting the tradition of the inhabitants of Libya, gives us a quite different account of him, which yet comes to the same; for he says that Jupiter Ammon was a great king, who, after his death, was reckoned a fabulous god, and a chimerical oracle. This historian mentions still another writer more ancient than himself, who wrote that Ammon reigned in Libya, and married Rhea the daughter of Cælus, sister to Saturn and other Titans, and that Rhea being divorced, she married Saturn, and induced him to make war against Ammon, whom he vanquished, and forced him to make his escape by sea, and retired to Crete, where he possessed himself of the kingdom.

Then the same author tells us, that Dionysius having conquered Egypt, established young Jupiter king of that country, and gave him Olympius to be his governor, from whence Jupiter was named Olympius.

Strabo writes, that the Arabians had also their Jupiter; however this Jupiter was but one of their kings, as it appears not only because he was associated with Bacchus, but also by the undertaking of Alexander. For this prince being acquainted that the Arabians honoured but two divinities, Jupiter and Bacchus, resolved to subdue them, that he might be their god amongst them.

Jupiter, in astronomy, ♃, one of the primary planets: it is the brightest of all,

except sometimes the planet Venus; and is much larger than any other planet.

The longer diameter of Jupiter is about 89,170 miles: and his mean distance from the sun about 490 millions of miles. His tropical revolution about the sun is performed in 4330d. 14h. 39m. 2s.: he therefore moves at the rate of more than 25 thousand miles per hour; and he revolves about his own axis in the short space of 9 hours 56 minutes, by which his equatorial parts are carried round at the amazing rate of 26 thousand miles per hour, which is about 25 times faster than the like parts of our earth revolve.

Jupiter is surrounded by faint substances, called zones or belts, in which so many changes appear, that they are generally ascribed to clouds. See Belts.

The axis of Jupiter is so nearly perpendicular to his orbit, that he has no sensible change of seasons; which is a great advantage, and wisely ordered by the author of nature. For, if the axis of this planet were inclined any considerable number of degrees, just so many degress round each pole would, in their turn, be almost six years together in darkness. And, as each degree of a great circle on Jupiter contains about 706 miles, it is easy to judge what vast tracts of land would be rendered uninhabitable by any considerable inclination of his axis.

The difference between the equatorial and polar diameters of Jupiter, is upwards of 6000 miles; the former being to the latter as 13 to 12. This happens from his quick motion round his axis; for the fluids, together with the light particles, which they can carry or wash away with them, recede from the poles which are at rest, towards the equator where the motion is quickest, until there be a sufficient number accumulated to make up the deficiency of gravity lost by the centrifugal force, which always arises from a quick motion round an axis.

Jupiter's orbit is 1. 19. inclined to the ecliptic. The place of his aphelion 11. 8. of ♎, the place of his ascending node 7. 29. of ♋, and that of his south or descending node 7.29. of ♑.

The gravity of bodies on the surface of Jupiter is nearly twice as great as on the surface of our earth: this, though, is in some measure compensated by the centrifugal force, which on the surface of Jupiter is about 60 times as great as on the surface of the earth. A body weighing 9 cwt. at Jupiter's equator, if the planet stood still, would gravitate with a force but as 8 cwt. upon the commencement of its diurnal rotation.

This planet has four satellites revolving about him. They are frequently eclipsed in the shadow of their primary, or hid behind his body; and the great subserviency of these eclipses and occultations to geography and navigation has occasioned the motions of these satellites to be very carefully observed. See Longitude and Satellites.

Mr. Pound observed long ago, that the irregularities of the three interior satellites were repeated in a period of 437 days; and this observation is found to be just to this day.

247	revolutions of the	first occupy	437 d.	3 h.	44′
123		second	437	3	42
61		third	437	3	36
26		fourth	435	14	16

This naturally led mathematicians to examine their motions, and see in what manner their relative positions, or configurations, as they are called, corresponded to this period: and it is found, that the mean longitude of the first satellite, minus thrice the mean longitude of the second, plus twice the mean longitude of the third, always made 180 degrees. This requires that the mean motion of the first, added to twice that of the third, shall be equal to thrice the mean motion of the second. This correspondence of the mean motions is of itself a singular thing, and the odds against its probability seems infinitely great; and when we add to this the particular positions of the satellites in any one moment, which is necessary for the above constant relation of their longitudes, the improbability of the coincidence, as a thing quite fortuitous, becomes infinitely greater. Doubts were first entertained of the coincidence, because it was not indeed accurate to a second. The result of the investigation is curious. When we follow out the consequences of mutual gravitation, we find, that although neither the primitive motions of projection, nor the points of the orbit from which the satellites were projected, were precisely such as suited these observed relations of their revolutions and their contemporaneous longitudes; yet, if they differed from them only by very minute quantities, the mutual gravitations of the satellites would in time bring them into those positions, and those states of mean motion, that would induce the observed relations; and when they are once reduced, they will be continued for ever.

Jupiter is a name applied in the writings of the older chemists, to tin.

Jupiter's *Beard*, in botany. See Anthyllis.

Jupiter's *Beard, American*. See Amorphe.

Jupiter's *Distaff*, in botany, a provincial name given to one or two of the species of Salvia, which see.

JUPPO'N. *s.* (*juppon*, French) A short close coat (*Dryden*).

JURA, a mountain, or rather a long chain of mountains, which extend from the Rhine, near Bale, to the Rhône, about ten miles below Geneva; sometimes more, some-

times less elevated; and in different places takes different names.

Jura, a department of France, bounded on the north by the department of the Upper Saône, on the east by the department of the Doubs and the canton of Bern, in Swisserland, on the south by the department of the Aine, and on the west by the departments of the Saône and Loire and Côte-d'Or. Lons le Saunier is the capital.

Jura, an island in the North Sea, near the west coast of Scotland, about twenty-five miles in length, and from two to six in breadth: chiefly mountainous or barren heath; however, from the thinness of the population, there is generally bear and oats enough for the consumption of the inhabitants, if not made into whiskey; as shell-fish and potatoes form the principal food of the poorer people. What are called *The Paps of Jura*, are three lofty mountains, of a conic form, of stupendous height. Some black cattle are raised, and about three or four hundred sold annually out of the island, and about one hundred horses: the wool is remarkable for its fineness; but the sheep are small, and not numerous: goats are in greater plenty. Some wild deer are still remaining, but the number is continually growing less. The number of inhabitants is said scarcely to exceed 900, who all reside on the east side of the island: the western part being too rugged for cultivation. There are two good harbours on the east side of the island, but no vessels above five or six tons belonging to them. The village of Jura is situated about the centre from north to south, on the east coast.

JU'RATS, magistrates like aldermen in several corporations.

IVREA, a strong town of Piedmont; capital of Canarez, with a bishop's see, a fort, and an ancient castle. Lat. 45. 22. N. Lon. 7. 48. E.

JU'RATORY. *a.* (*juratoire*, Fr.) Comprising an oath (*Ayliffe*).

JURI'DICAL. *a.* (*juridicus*, Latin.) 1. Acting in the distribution of justice. 2. Used in courts of justice (*Hale*).

JURI'DICALLY. *ad.* With legal authority; according to forms of justice.

JURIEU (Peter), a French protestant divine, was born in 1637. He studied under his uncle Peter du Moulin, in England, and was episcopally ordained, but was afterwards re-ordained in the presbyterian manner. On his return to France he became professor of divinity and Hebrew at Sedan; but when the persecution commenced, he fled to Holland, and settled at Rotterdam, where he brought himself into great notice by his controversial writings, and by his Commentary on the Revelations, in which he predicted the speedy destruction of Antichrist. He died in 1713. He wrote a History of Calvinism, and many pieces against popery.

JU'RIN (Dr. James), a distinguished person, who cultivated medicine and mathematics with equal success. He was secretary of the Royal Society in London, as well as president of the College of Physicians there. He had great disputes with Michelloti upon the momentum of running waters, with Robins upon distinct vision, and with the partisans of Leibnitz upon moving bodies. A treatise of his "upon Vision" is printed in Smith's "Optics." He died in 1750. Some of his papers in the Phil. Trans. are very valuable.

JU'RISCONSULTUS, or Jureconsultus, Ictus, among the Romans, was a person learned in the law; a master of the Roman jurisprudence; who was consulted on the interpretation of the laws, and customs, and the difficult points in law-suits.

JURISDI'CTION. *s.* (*jurisdictio*, Latin.) 1. Legal authority; extent of power (*Hayw.*) 2. District to which any authority extends.

JURISPRU'DENCE. *s.* (*jurisprudence*, French; *jurisprudentia*, Latin.) The science of law.

JU'RIST. *s.* (*juriste*, Fr.) A civil lawyer; a man who professes the science of the law; a civilian (*Bacon*).

JU'ROR. *s.* (*juro*, Latin.) One that serves on the jury (*Spenser. Dryden*).

JU'RY, a certain number of persons sworn to inquire of and try some matter of fact, and to declare the truth upon such evidence as shall be laid before them. The jury are sworn judges upon all evidence in any matter of fact. Juries may be divided into two kinds, common and special. A common jury is such as is returned by the sheriff, according to the directions of the statute 3 George II. chap. 25, which appoints that the sheriff's officer shall not return a separate pannel for every separate cause, but one and the same pannel for every cause to be tried at the same assizes, containing not less than forty-eight, nor more than seventy-two jurors; and their names being written on tickets shall be put into a box or glass, and when each cause is called, twelve of those persons whose names shall be first drawn out of the box shall be sworn upon a jury, unless absent, challenged, or excused. When a sufficient number of persons are impannelled, they are then separately sworn well and truly to try the issue between the parties, and a true verdict give according to the evidence.

Special juries were originally introduced in trials at bar, when the causes were of too great nicety for the discussion of ordinary freeholders. To obtain a special jury, a motion is made in court, and a rule is granted thereupon, for the sheriff to attend the master, prothonotary, or other proper officer, with his freeholder's book, and the officer is to take indifferently forty-eight of the principal freeholders, in the presence of the attornies on both sides, who are each

of them to strike off twelve, and the remaining twenty-four are returned upon the pannel.

Jurors are punishable for sending for, or receiving, instructions from either of the parties concerning the matter in question.

In causes of nisi prius, every person whose name shall be drawn, and who shall not appear after being openly called three times, shall, on oath made of his having been lawfully summoned, forfeit a sum not exceeding 5l. nor less than 40s. unless some reasonable cause of absence be proved, by oath or affidavit, to the satisfaction of the judge. If any juror shall take of either party to give his verdict, he shall, on conviction, by bill or plaint, before the court where the verdict shall pass, forfeit ten times as much as he has taken; half to the king, and half to him who shall sue. A man who shall assault or threaten a juror for giving a verdict against him, is highly punishable by fine and imprisonment; and if he strike him in the court, in the presence of the judge of assize, he shall lose his hand and his goods, and the profits of his lands during life, and suffer perpetual imprisonment.

The mode of trial by jury is very ancient, and seems to have been coeval with the civil government of this nation. Traces of juries may be found in the laws of all those nations which adopted the feudal system, as in Germany, France, and Italy; and in England we find actual mention of them so early as the laws of king Ethelred, and even then not as a new invention. The establishment and use of this mode of trial in our island, though for a time greatly impaired and shaken by the introduction of the Norman trial by battle, were so highly esteemed and valued by the people, that no conquest, no change of government, could ever prevail to abolish it. See Judicium Parium.

Trial by Jury has long been one of the objects of English idolatry. But the Edinburgh Reviewers, who inform us "they are not partial to idols," have lately striven to remove our prejudices upon this subject. They say "there is a kind of established *cant* upon this subject, which we suppose must always be used to the vulgar, like the *slang* about roast beef and liberty." "The fact," they continue, "is that we are *misled* into an admiration of juries, from what we see of them in criminal cases." The way in which these "lights of the world" think we are misled in respect to juries, we have not much inclination to explore here: the "cant" about juries, is a cant we like; those who are tired of the sound, and wish to fortify themselves with plausible arguments *against a national blessing* may turn to the 18th No. of the work just mentioned.

JU'RYMAN. *s. (jury* and *man.)* One who is impannelled on a jury (*Swift*).

JU'RYMAST. *s.* So the seamen call whatever they set up in the room of a mast lost in a fight or by a storm (*Harris*).

JUS coronæ. See Hereditary *Right* and Succession.

Jus *Civile*, among the Romans, signified no more than the interpretation given by the learned, of the laws of the twelve tables, though the phrase now extends to the whole system of the Roman laws.

Jus *Civitatis* signifies freedom of the city of Rome, which entitled those persons who had obtained it to most of the privileges of Roman citizens—yet it differs from Jus Quiritium, which extended to all the advantages which a free native of Rome was entitled to—the difference is much the same as betwixt denization and naturalization with us.

Jus *Trium Liberorum* was a privilege granted to such persons in the city of Rome as had three children, by which they were exempted from all troublesome offices. The same exemption was granted to any persons who lived in other parts of Italy, having four children; and those that lived in the provinces, provided they had five (or as some say seven) children were entitled to the same immunities. This was good policy, and tended to the population of the empire. See Children.

JU'SSIEVA. So denominated from the deservedly celebrated Jussiev. A botanic genus of the class decandria, order monogynia. Calyx four or five parted;—superior; petals four or five; capsule four or five celled, oblong, opening at the angles; seeds numerous, minute.

Twelve species natives of the East or West Indies or South America: mostly herbaceous, a few shrubby.

JUST. *a.* (*juste*, French.) 1. Upright; incorrupt; equitable in the distribution of justice (*Dryden*). 2. Honest; without crime in dealing with others (*Tillotson*). 3. Exact; proper; accurate (*Glanville*). 4. Virtuous; innocent; pure (*Matthew*). 5. True; not forged (*Hooker*). 6. Grounded on principles of Justice; rightful (*Milton*). 7. Equally retributed (*Romans*). 8. Complete without superfluity (*Bacon*). 9. Regular; orderly (*Addison*). 10. Exactly proportioned (*Shaks.*) 11. Full; of full dimensions (*Knolles*).

Just. *ad.* 1. Exactly; nicely; accurately (*Hooker*). 2. Merely; barely (*Dryden*). 3. Nearly; almost (*Temple*).

Just, a sportive kind of combat on horseback, a man against man, armed with lances. Justs and tournaments differ in this that the latter is the genus, of which the former is only a species. Tournaments included all kinds of military sports and engagements made out of gallantry and diversion: justs were those particular combats where the parties were near each other, and engaged with lance and sword. Add, that the tournament was frequently performed by a num-

ber of cavaliers, who fought in a body: the just was a single combat of one man against another.

To Just. *v. n.* (*jouster*, French.) 1. To engage in a mock fight; to tilt. 2. To push; to drive; to justle.

JU'STICE. *s.* (*justice*, French; *justitia*, Latin.) 1. The virtue by which we give to every man what is his due (*Locke*). 2. Equity; agreeableness to right. 3. Vindicative retribution; punishment (*Bacon*). 4. Right; assertion of right (*Shakspeare*). Justice may be divided into distributive, commutative, and legal.

Ju'stice, *distributive*, is concerned in matters of government, and of beneficence; and is either remuneratory, or punitive: it observes an equality in dealing rewards and punishments, according to each man's condition and merit; for as actions are either good or evil, for the good, rewards must be assigned; and for the evil, punishments; and herein a geometrical proportion is observed.

Ju'stice, *commutative*, is conversant in matters of commerce, and in the equal commutation, or changing, of things; and proceeds according arithmetical equality, without any regard to persons and circumstances.

Ju'stice, *legal*, is that which resides in the state, or monarch, by whose power and authority the effects of commutative and distributive justice are frequently superseded, or suspended; as in a dearth of corn, if a person that has a stock by him will not sell it, it shall be taken from him; and the like.

Ju'stice is also an appellation given to a person deputed by the king to administer justice to his subjects, whose authority arises from his deputation, and not by right of magistracy. Of these justices there are various kinds in England; viz.

Chief Justice of the King's Bench is the capital justice of Great Britain, and is a lord by his office.. His business is chiefly to hear and determine all pleas of the crown; that is, such as concern offences against the crown, dignity, and peace of the king; as treasons, felonies, &c. The officer was formerly not only chief justice, but also chief baron for the exchequer, and master of the court of wards. He usually sat in the king's palace, and there executed that office formerly performed per comitem palatii; he determined in that place all the differences happening between the barons and other great men. He had the prerogative of being the vicegerent of the kingdom whenever the king went beyond sea, and was usually chosen to that office out of the prime nobility; but his power was reduced by king Richard I. and king Edward I. His office is now divided, and his title changed from capitalis Angliæ justitiarius, to capitalis justitiarius, ad placita coram regetenda, or capitalis justitiarius banci regii.

Chief Justice of the Common Pleas, he who with his assistants hears and determines all causes at the common law; that is to say, all civil causes between common persons, as well personal as real; and he is also a lord by his office.

Ju'stice *of the Forest*, is a lord by his office, who has power and authority to determine offences committed in the king's forests, &c. which are not to be determined by any other court of justice. Of these there are two; whereof one has jurisdiction over all the forests on this side Trent, and the other beyond it.

JU'STICES of Assise, are such as were wont, by special commission, to be sent into this or that country to take assises.

Ju'stices *in Eyre* (*justitiarii itinerantes*, or *errantes*), were those who were anciently sent with commission into divers counties to hear such causes especially as were termed pleas of the crown; and that for the ease of the subject, who must else have been hurried to the courts of Westminster, if the cause were too high for the county-courts. According to some, these justices were sent once in seven years; but others will have them to have been sent oftener. Camden says, they were instituted in the reign of king Henry II. A. D. 1184; but they appear to be of an older date. They were somewhat like our justices of assise at this day.

Ten Justices of Gaol Delivery, are such as are sent to determine all causes pertaining to such as for any offence are cast into gaol.

Ju'stices *of Nisi Prius*, are now the same with justices of assise. It is a common adjournment of a cause in the common pleas to put it off to such a day, Nisi prius justitiarii venerint ad eas partes ad capiendas assisas: from which clause of adjournment they are called justices of nisi prius, as well as justices of assise, on account of the writ and actions they have to deal in.

Ju'stices *of oyer and terminer*. As the justices of assize and nisi prius are appointed to try civil cases, so are the justices of oyer and terminer, and gaol delivery, to try indictments for all crimes all over the kingdom, at what are generally denominated the circuits or assizes; and the towns where they come to execute their commission are called the assize towns, and are generally the county towns.

Justices *of the peace*, are persons appointed by the king's commission, to attend to the peace of the county where they dwell. They were called guardians of the peace till the thirty-sixth year of Edw. III. c. 12, where they are called justices. A justice of the peace must, before he acts, take the oath of office, which is usually done before some persons in the county, by virtue of a dedimus protestatem out of chancery. Sheriffs, coroners, attorneys, and proctors, may not act as justices of the peace.

The power, office, and duty of this magistrate extends to an almost infinite number of instances, specified in some hundreds of acts of parliament, and every year accumulating. The commission of the peace does not determine by the demise of the king, nor until six months after, unless sooner determined by the successor: but before his demise, the king may determine it, or may put out any particular person, which is most commonly done by a new commission, leaving out such person's name.

Justices of the peace can only be appointed by the king's special commission, and such commission must be in his name; but it is not requisite that there should be a special suit or application to, or warrant from the king for the granting it, which is only requisite for such as are of a particular nature, as constituting the mayor of such a town and his successors perpetual justices of the peace within their liberties, &c. which commissions are neither revocable by the king, nor determinable by his demise, as the common commission of the peace is, which is made of course by the lord chancellor according to his discretion.

The form of the commission of the peace, as it is at this day, was, according to Hawkins, settled by the judges about 23 Elizabeth.

The power of justices is ministerial, when they are commanded to do any thing by a superior authority, as the court of Banco Regis, &c. In all other cases they act as judges; but they must proceed according to their commission, &c. Where a statute requires an act to be done by two justices, it is an established rule, that if the act be of a judicial nature, or the result of discretion, the two justices must be present to concur and join in it, otherwise it will be void; as in the orders of removal and filiation, the appointment of overseers, and the allowance of the indenture of a parish apprentice; but where the act is merely ministerial, they may act separately, as in the allowance of a poor-rate. This is the only act of two justices which has been construed to be ministerial; and the propriety of this construction has been justly questioned.

Where a justice shall exceed his authority in granting a warrant, the officer must execute it, and he is indemnified for so doing; but if it be in a case wherein he has no jurisdiction, or in a matter whereof he has no cognizance, the officer ought not to execute such warrant; for the officer is bound to take notice of the authority and jurisdiction of the justice. If a justice of the peace will not, on complaint to him made, execute his office, or if he shall misbehave in his office, the party grieved may move the Court of King's Bench for an information, and afterwards may apply to the Court of Chancery to put him out of the commission. But the most usual way of compelling justices to execute their office, in any case, is by writ of mandamus out of the Court of King's Bench.

Where the plaintiff in an action against a justice shall obtain a verdict, and the judge shall in open court certify on the back of the record, that the injury for which such action was brought was wilfully and maliciously committed, the plaintiff shall have double costs. And if a justice of peace act improperly, knowingly, information shall be granted. No justice shall be liable to be punished both ways, that is, criminally and civilly; but before the court will grant an information, they will require the party to relinquish the civil action, if any such be commenced. And even in the case of an indictment, and though the indictment be actually found, the attorney-general, on application made to him, will grant a noli prosequi upon such indictment, if it appear to him that the prosecutor is determined to carry on a civil action at the same time.

If any action shall be brought against a justice for any thing done by virtue of his office, he may plead the general issue, and give the special matter in evidence; and if he recover, he shall have double costs. Such action shall not be laid but in the county where the fact was committed. And no suit shall be commenced against a justice of the peace till after one month's notice. And unless it is proved upon the trial that such notice was given, the justice shall have a verdict and costs. And no action shall be brought against any constable or other officer, or any person acting by his order and in his aid, for any thing done in obedience to the warrant of a justice, till demand hath been made, or left at the usual place of his abode, by the party or by his attorney, in writing, signed by the party demanding the same, of the perusal and copy of such warrant, and the same has been refused or neglected for six days after such demand. And no action shall be brought against any justice for any thing done in the execution of his office, unless commenced within six months after the act committed.

To Ju'stice. *v. a.* (from the noun.) To administer justice to any: not in use (*Hayw.*)

JU'STICEMENT. *s.* (from *justice.*) Procedure in courts.

* JU'STICER. *s.* (from *To justice.*) Administrator of justice (*Davies*).

JU'STICESHIP. *s.* (from *justice.*) Rank or office of justice (*Swift*).

JU'STICIA. In botany, a genus of the class diandria, order monogynia. Calyx single or double; corol one-petalled irregular; capsule opening with an elastic claw, the partition opposite to the valves. Ninety species; natives of Asia, Africa, and America, but not of Europe. They may be thus subdivided.

A. With a double calyx and single anther; and hence not properly belonging to this class.

B With a double calyx and two anthers.

C With a single calyx, corol two-lipped, the lips undivided.

D Calyx single; corol two-lipped, the lips divided; anther single.

E Calyx single; corol two-lipped, the lips divided; anthers double.

F Calyx single; corol ringent; anthers single.

G Calyx single; corol ringent; anthers double.

H Calyx single; corol nearly equal.

I Calyx and corol unknown.

JU'STICIABLE. *a.* (from *justice.*) Proper to be examined in courts of justice.

JU'STICIAR, in our old laws, an officer instituted by William the Conqueror, as the chief officer of state, and who principally determined all pleas civil and criminal. He was called in Latin, capitalis justiciarius, totius Angliæ.

JU'STICIARII, in church history, an appellation given to heretics who boast much of perfect righteousnes, and despise others: such were the Pharisees among the Jews, and the Novations and Donatists among the Christians.

JU'STICIARIUS, *Magister*, a judge in the kingdom of Naples, who has supreme jurisdiction in all cases of treason, and pleas of the crown, and finally determines all appeals. He has four assessors.

JU'STICIARY *Court*, in Scotland. The court of justiciary has supreme jurisdiction in all criminal causes. It came in place of that of justice-eyre, or justice-general, which was last in the person of the earl of Argyle, who transacted for it with king Charles I. and was made justice-general of all the islands; which raising great debates between him and some hereditary sheriffs there, the jurisdiction was taken away in 1672, and this court of justiciary erected instead of it, consisting of a justice-general, alterable at the king's pleasure; a justice-clerk, and five other judges, who are likewise lords of the session.

This court commonly sits on Mondays, and has an ordinary clerk, who has his commission from the justice-clerk. They have four ordinary macers and a doomster appointed by the lords of session.

JU'STIFIABLE. *a.* (from *justify.*) Defensible by law or reason (*Brown*).

JU'STIFIABLENESS. *s.* Rectitude; possibility of being fairly defended (*K. Charles*).

JU'STIFIABLY. *ad.* (from *justifiable.*) Rightly; so as to be supported by right (*Locke*).

JUSTIFICA'TION. *s.* (*justification*, Fr.) 1. Absolution (*Shakspeare*). 2. Defence; maintenance; vindication; support (*Swift*). 3. Deliverance by pardon from sins past (*Clarke*).

JUSTIFICA'TOR. *s.* (from *justify.*) One who supports, defends, vindicates, or justifies.

JU'STIFIER. *s.* (from *justify.*) One who justifies; one who defends or absolves; one who frees from sin by pardon (*Romans*).

To JU'STIFY. *v. a.* (*justifier*, French.) 1. To clear from imputed guilt; to absolve from an accusation (*Dryden*). 2. To maintain; to defend; to vindicate (*Atterbury*). 3. To free from past sin by pardon (*Acts*).

JU'STIN, a Latin historian of the second century. He made an abridgment of the Universal History of Trogus Pompeius. This work remains, but the original is lost. It is written in an excellent style, clear, and interesting. The best editions are that of Oxford, 8vo. 1705, and that of Barbou, Paris, 1770, 12mo.

JU'STIN, surnamed the Martyr, a celebrated father of the church, was born in Samaria, of heathen parents. He attached himself to the doctrines of Plato, and became a distinguished philosopher. He was converted to Christianity about the year 132, but still continued to wear the pallium or cloak of the Greek philosophers. In the reign of Antoninus Pius he went to Rome, where he opposed the heresy of Marcion, and presented to the emperor an Apology for the Christians, which prevailed so far as to obtain a temporary stop to the persecution. He afterwards went to Ephesus, where he formed an acquaintance with Trypho, a noted Jew, his dialogue with whom is still extant. He returned again to Rome, where he suffered martyrdom, A. D. 165. The best editions of St. Justin are those of R. Stephens, in 1551 and 1571, in Greek and Latin; that of Morel, in Greek and Latin 1656; and that of Don Pondentius Marandus, a learned Benedictine, in 1742, in folio.

JU'STINIAN I. emperor of Rome, succeeded his uncle Justin I. in 527. He was a zealous protector of Christianity, and carried his arms with great success against his enemies, for which indeed he was chiefly indebted to his general Belisarius, who also preserved him from a formidable conspiracy that was formed against him. Peace being restored, Justinian set himself to form into a body all the Roman laws, which was executed under the title of Digests or Pandects. After this great work was accomplished, the laws of modern date were collected into one volume called, the Novellæ. He exerted himself against the ecclesiastical encroachments of Popes Sylverius and Vigilius, and died in 565, aged 83. He built many churches, particularly the famous Sancta-Sophia at Constantinople, and abolished the consulate.

JU'STINIAN II. was the eldest son of Constantine Pogonatus, whom he succeeded in 685. He retook several provinces from the Saracens, and made an advantageous peace with them; but his actions, cruelties, and debaucheries, tarnished the glory of his arms. He formed the design of massacreing all the inhabitants of Constantinople, which being discovered, this new Nero was deposed and sent into exile. But he afterwards re-

covered his throne, though he still continued his cruelties. He was slain in 711 by Philippicus Bardanes, his successor.

JU'STINIANI (Augustin) bishop of Nebbio in the isle of Corsica, was born at Genoa in the year 1470. He became a Dominican the 25th of April, 1487, and applied himself to his studies with so much earnestness, and under such able masters, that he became a very learned man. He understood philosophy, mathematics, divinity, Greek, Hebrew, Arabic, and Chaldee. He taught in the province of Lombardy eighteen years with great advantage to his hearers; he was made bishop of Nebbio the 15th of November, 1514, at the recommendation of Cardinal Bendinello Saoli his cousin, and received his bulls before he knew the good offices this cardinal had done him. He assisted at the coucil of Lateran, and opposed some articles of the Concordate agreed upon between France and the court of Rome. Nevertheless Francis I. invited him to Paris, and made him his almoner. He made use of this prelate's great skill to set up the study of the Oriental tongues in the university of Paris. Justiniani finding himself so near England, took a voyage thither, and was very much caressed by Henry VIII. He collected a very fine library, and left it by his will to the republic of Genoa. He made many reparations in his bishopric, and increased the revenues of it; he so beautified his cathedral church, dedicated to the holy virgin, that Maracci placed him among her faithful servants. He also translated into the vulgar tongue some Latin works, the reading whereof might be useful to clergymen. He lost his life at sea, in passing from Genoa to the isle of Corsica, in the year 1536. He was not only a learned prelate, but very laborious, as appears from the works he composed, and from those which he caused to be printed. He went about a Polyglot bible, part whereof we may reckon the psalter, which he published. He was at great charges for the edition, and finding that he could not get his money by the sale, and that the princes did not promote his designs, he complained of the ingratitude of his age.

JU'STITIA, in Pagan worship, one of the virtues to whom the Romans erected altars. She was represented in the figure of a woman with a severe countenance, holding a pair of scales in one hand, and a sword in the other; or rods, and a bundle of axes, and sitting upon a square stone. She frequently appears blindfold, to shew that justice has no respect of persons.

JUSTERBOCH, a town of Upper Saxony, situate on the Angerbach. Lat. 52. 1. N. Lon. 12. 52. E.

To JU'STLE. *v. n.* (*jouster*, French.) To encounter; to clash; to rush against each other (*Lee*).

To JU'STLE. *v. a.* To push; to drive; to force by rushing against it (*Brown*).

JU'STLY. *ad.* (from *just.*) 1. Uprightly; honestly; in a just manner (*South*). 2. Properly; exactly; accurately (*Dryden*).

JU'STNESS. *s.* (from *just.*) 1. Justice; reasonableness; equity (*Shaks.*) 2. Accuracy; exactness; propriety (*Dryden*).

To JUT. *v. n.* (supposed to be corrupted from *jet*, perhaps from *shoot.*) To push or shoot into prominences; to come out beyond the main bulk (*Broome*).

JUTES, the ancient inhabitants of Jutland in Denmark.

JUTLAND, a large peninsula, which makes the principal part of the kingdom of Denmark. It is bounded on the south-east by the duchy of Holstein, and is surrounded on the other sides by the German Ocean and the Baltic sea. It is about 180 miles in length from north to south, and 50 in breadth from east to west. The air is very cold, but wholesome; and the soil is fertile in corn and pastures, which feed a great number of beeves, that are sent to Germany, Holland, and elsewhere. This was anciently called the Cimbrian Chersonesus, and is supposed to be the country from whence the Saxons came into England. It is divided into two parts, called North and South Jutland.

To JU'TTY. *v. a.* (from *jut.*) To shoot out beyond (*Shakspeare*).

JUVENAL (Decius Junius), a celebrated poet born at Aquinum in Italy. He came early to Rome, and passed some time in declaiming; after which he applied himself to write satires, 16 of which are extant. He spoke with virulence against the partiality of Nero for the pantomime Paris, and though all his satire was pointed against this favourite, yet Juvenal lived in security during the reign of Nero. After the death of Nero, he was sent by Domitian, as governor, or rather in exile, on the frontiers of Egypt, in the 80th year of his age. He returned, however, to Rome after the death of Paris, and died in the reign of Trajan, A. D. 128. His writings are fiery and animated. He is particularly severe upon the dissipation of the age he lived in, but the gross manner in which he exposes to ridicule the follies of mankind, rather encourages than disarms the licentious. Juvenal was far more correct than his contemporaries, a circumstance attributed to his matured judgment and experience. He may be called, and with reason, perhaps the last of the Roman poets. After him poetry decayed, and nothing more claims attention as a perfect poetical composition. Among the principal editions of Juvenal, we may specify the following. The Editio Princeps, printed by Vindelin de Spira, at Venice, in 1470; folio. The valuable edition of Jac. Rubeus, Venice, folio, 1475. The Aldine editions in 8vo. of 1501, and 1535. Lusbinus's edition, Hanover, 4to. 1603—13. The Glasgow edition, Foulis, 8vo. 1750. Ruperti, Lipsiæ, 8vo. 1801. The latter is a very learned and valuable edition, and contains more information respecting

the author than any other edition extant. The best translation is that of Wm. Gifford, Esq.

JU'VENALIA, games and combats instituted by Nero, the first time his beard was shaven.

JU'VENILE. *a.* (*juvenilis*, Latin.) Young; youthful (*Bacon*).

JUVENI'LITY. *s.* (from *juvenile.*) 1. Youthfulness (*Glanville*). 2. Light and careless manner (*Glanville*).

JUVENTAS, in mythology, the goddess whom the Romans supposed to preside over youth.

JUXON (William), archbishop of Canterbury, was born at Chichester, and educated at Merchant Taylors' school, from whence he was removed to St. John's college, Oxford, of which he became fellow, and in 1621 president. In 1627 he was promoted to the deanery of Worcester; in 1633 made clerk of the closet to the king, and the year following bishop of Hereford. His next remove was to the see of London, and in 1635, by the means of archbishop Laud, he was appointed lord treasurer, which gave great offence to the temporal lords; however, his conduct was irreproachable. He attended Charles I. on the scaffold, and at the restoration was made archbishop of Canterbury. He died in 1663, aged 61.

JU'XTAPOSITION. *s.* (*juxta* and *positio*, Latin.) Apposition; the state of being placed by each other (*Glanville*).

I'VY. In botany. See HEDERA.

I'VY, *Bindweed-leaved.* See MENISPERMUM.

I'VY, *Ground.* See GLECHOMA.

I'VY *tree of America.* See KALMIA.

I'VY, *Gum.* See GUMMI *Hedera.*

IXIA, in botany a genus of the triandrian monogynian class and order. Natural order ensatæ. Irides, Jussieu. Essential character: corol one-petalled, tubular; tube straight, filiform; border six-parted, bell-shaped, regular; stigmas three or six, simple. There are fifty-four species. Ixia differs from antholyza in having the segments of the corol nearly equal; from gladiolus, in the situation of the segments of the corol, and in having the tube straight. Almost all the species are natives of the Cape of Good Hope.

IXINE. See CARLINA GUMMIFERA.

IXION, in fabulous history, king of the Lapithes, married Dia, the daughter of Deionius, to whom he refused to give the customary nuptial presents. Deionius in revenge took from him his horses: when Ixion, dissembling his resentment, invited his father-in-law to a feast, and made him fall through a trap-door into a burning furnace, in which he was immediately consumed. Ixion being afterwards stung with remorse for his cruelty, ran mad, on which Jupiter in compassion, not only forgave him, but took him up into heaven, where he had the impiety to endeavour to corrupt Juno. Jupiter to be the better assured of his guilt, formed a cloud in the resemblance of the goddess, upon which Ixion begat the Centaurs: but boasting of his happiness, Jove hurled him down to Tartarus, where he lies fixed on a wheel encompassed with serpents, which turns without ceasing.

IXORA, in Pagan worship, a false god of the East Indians. The Bramins imagine that he is infinite; to illustrate which they say, that Brama, another of their gods, being desirous of seeing Ixora's head, flew up to heaven for that purpose, but found his endeavours vain. On the other hand Vistnou, the god of metamorphoses, willing to find the place where his feet stood, transformed himself into a hog, and made a deep hole in the ground with his snout, but without success. The body of Ixora, they say, is so bulky, that the serpent Baltagu, which surrounds seven worlds, is not long enough to serve him for a bracelet. He is represented standing on a pedestal, his head adorned with long hair, his face white and shining, with three eyes, and a crescent upon his forehead. He has sixteen arms, each of which grasps something: one holds fire, another pieces of money, another a drum, another a rope, another a string of beads, another a stick, another a wheel, another a serpent, another a bell, &c. He has an elephant's skin over his shoulders, and is surrounded with several serpents. He wears also a necklace, at which hangs a little bell. All these particulars are said to be emblematical; thus his sixteen hands denote his great power; the serpents twining about him, the revolution of ages; and the little bell, his great vigilance.

I'XORA. In botany a genus of the class tetrandria; order monogynia. Corol one-petalled, funnel-form, long, superior; stamens seated above the mouth of the corol; berry four-seeded. Ten species natives of the East or West Indies, with yellow, white, scarlet, or violet flowers, generally in corymbs and elegantly disposed. The stem is woody, or shrubby; in some species herbaceous: several are propagated in our hot-houses, and considerably contribute to their beauty.

IXWORTH, a town in Suffolk, with a market on Fridays. Lat. 52. 20. N. Lon. 0. 51. E.

IXYS. (ιξυς, corrupted from ισχυς, strength.) The loin. See ISCHYS.

I'YAR. See JAR.

JYEPOUR, a city of Hindustan Proper in Agra, capital of a territory of the same name. An observatory was erected here in 1734. Lat. 26. 56. N. Lon. 76. 9. E.

J'YNX, or YUN, the wryneck, a genus of birds belonging the order of picæ; the characters of which are, that the bill is slender, round, and pointed; the nostrils concave and naked; the tongue very long, very slender, cylindric, and terminated by a hard point; and the feet formed for

climbing. There is only one species, viz. the torquilla. The colours of this bird are elegantly pencilled, though its plumage is marked with the plainest colours. The wryneck, Mr. Pennant apprehends, is a bird of passage, appearing with us in the spring before the cuckoo. Its note is like that of the kestril, a quick-repeated squeak; its eggs are white, with a very thin shell; it builds in the hollows of trees, making its nest of dry grass. It has a very whimsical way of turning and twisting its neck about, and bringing its head over its shoulders, whence it had its Latin name torquilla, and its English one of wryneck. See YUN.

IZQUINTENANGO, a town of New Spain, in the province of Chiapa. The country about it produces cotton and a great number of pine-apples. Lat. 16. 0. N. Lon. 93. 45. W.

K

K, A double consonant, and the tenth letter of the alphabet.

This consonant has the sound of hard *c*, and is used before *e* and *i*, where, according to the English analogy, *c* would be soft; as in the words *kept*, *king*; at the end of words it is not much used, except after *c*, and chiefly in monosyllables, as *clock*, *back*, &c. It is now properly omitted in many other words, as *music*, *public*, &c. It is also used between a vowel and the silent *e* final, as *cloke*, *broke*, &c. It likewise ends a word after a diphthong, as *look*, *break*, &c. In the present pronunciation, *k* is silent before *n*.

K is borrowed from the Greek *kappa*; and was but little used among the Latins: Priscian looked on it as a superfluous letter, and says, it was never to be used except in words borrowed from the Greek. Dausquius, after Sallust, observes, that it was unknown to the ancient Romans. Indeed we seldom find it in any Latin authors, excepting in the word *kalendæ*, where it sometimes stands in lieu of a *c*. Carthage, however, is frequently spelt on medals with a *K*: *Salvis Aug. et Caes. Fel. Kart.* and sometimes the letter *K* alone stood for *Carthage*. M. Berger has observed, that a capital *K*, on the reverse of the medals of the emperors of Constantinople, signified Konstantinus; and on the Greek medals he will have it to signify ΚΟΙΛΗ ΣΥΡΙΑ, Coelesyria.

Quintilian tells us, that in his time some people had a mistaken notion, that wherever the letter *c* and *a* occurred at the beginning of a word, *k* ought to be used instead of the *c*. See C.

Lipsius observes, that *K* was a stigma, anciently marked on the foreheads of criminals with a red-hot iron.

The letter *K* has various significations in old charters and diplomas; for instance, KR. stood for *chorus*, KR. C. for *cara civitas*, KR M. for *carmen*, KR AM. N. *carus amicus noster*, KS. *chaos*, KT. *capite, tonsus*, &c.

The French never use the letter *k*, excepting in a few terms of art, and proper names borrowed from other countries. Ablancourt, in his dialogue of the letters, brings in *k* complaining, that it has been often in a fair way to be banished out of the French alphabet, and confined to the countries of the North.

K is also a numeral letter, signifying 250, according to the verse;

K quoque ducentos & quinquaginta tenebit.

When it had a stroke at top, $\overline{K}$, it stood for 250,000.

K on the French coinage denotes money coined at Bourdeaux.

KAARTA, a kingdom in Africa, through which Mr. Park passed in his route from the Gambia to the Niger. He describes the country as consisting either of sandy plains or rocky hills; but, from his account, the level part seems to be the most extensive. The natives are negroes, of whom many, though converted to the Mahomedan faith, or rather to the ceremonial part of the Mahomedan religion, retain all their ancient superstitions, and even drink strong liquors. They are called Johers or Jowers, and in Kaarta form a very numerous and powerful tribe. One of these men undertook to conduct our author to Kemmoo, the capital of the kingdom, and alarmed him not a little by his superstitious ceremonies. White men were strangers in the kingdom of Kaarta; and the appearance of our author had on some of the natives the effect which ignorant people, in this country, attribute to ghosts. Kemmoo, the metropolis of this kingdom, lies in lat. 14. 15. N. Lon. 7. 20. W.

KABOBIQUAS, a nation in the south of Africa, who are reported never to have seen a white man, till the year 1785, when they were visited by Mr. Vaillant.

The Kabobiquas have neither the flat nose nor plump cheeks of the Hottentots. Their skin also has not that bastard colour, which being neither black nor white, renders them odious to both races; nor do they besmear their bodies with those disgusting fat substances, on account of which one cannot approach them without being bedaubed with their filth, or acquiring an offensive smell. In stature they are as tall as the Caffres, and their colour is equally black. Their hair, which is exceedingly short, and much curled, is ornamented with small copper buttons, arranged with great art and symmetry. Instead of that apron made of a jackal's skin, employed by the Hottentot to cover what modesty bids him conceal, the Kabobiquas use a round piece of leather, the edge of which is ornamented with a small indented circle of copper, and which is divided into different compartments by rows of glass beads of various colours, all proceeding from the centre, and diverging towards the circumference, like the rays in our images of the sun.

Of the religion of the Kabobiquas, M. Vaillant talks very inconsistently, and like a true philosopher of the French school, says, "Of all the African nations, they are the only people among whom I found any idea, however confused a one, of the existence of a Deity. I do not know whether it be from their own reflection, or the communications of other tribes, that they have acquired this sublime knowledge, which would alone bring

them near to a level with polished nations; but they believe, as far as I have been able to learn from my people, that beyond the stars there exists a Supreme Being, who made and who governs all things. I must however observe, that on this subject their ideas are vague, barren, and unproductive. They have no conception of the future existence of the soul, or of rewards and punishments in another life; in short, they have neither worship, sacrifices, ceremonies, nor priests, and are total strangers to what we call religion."

This is impossible. A people believing in a Supreme Being, who made and who governs all things, may indeed be without sacrifices, ceremonies, and priests: but such a people cannot avoid wishing, that the Being who governs all things may protect them. Such a wish is a prayer; and surely he who prays is no stranger to religion. M. Vaillant places the country of the Kabobiquas between 23. and 25. S. lat. and 16. 26. and 19. 25. lon. east from Paris.

KADANAUE, in botany, a name for the ALOE; which see.

KADESH, KADESH-BARNEA, or *En Mishpat*, in ancient geography, a city celebrated for several events. At Kadesh, Miriam the sister of Moses died (Numb. xx. 1.) Here it was that Moses and Aaron, showing a distrust in God's power when they smote the rock at the waters of strife, were condemned to die without the consolation of entering the promised land (Numb. xxvii. 14.) This city was given to the tribe of Judah, and was situated about eight leagues from Hebron to the south. Mr. Wells is of opinion, that this Kadesh, which was situated in the wilderness of Zin, was a different place from Kadesh-barnea, in the wilderness of Paran.

KADMONÆI, or CADMONÆI, in ancient geography, a people of Palestine, said to dwell at the foot of Mount Hermon; which lies east, and is the reason of the appellation, with respect to Libanus, Phœnicia, and the north parts of Palestine. Called also Hevæi (Moses).

KÆMPFERIA. In botany, a genus of the class monandria; order monogynia. Calyx none, or obsolete: coral six-parted; the three larger divisions expanding, one of them two-parted: stigma bilamellate. Two species.

1. K. Galanga. Leaves ovate, sessile: root bulbous; stemless; flowers sessile, white with a violet spot in the middle. Corl salver-form, with a curved tube: a native of India. This species is commonly identified, but erroneously with the galangale of the shops. The true galangale is the Alpinia Galarga of the East Indies. See ALPINIA.

2. K. Rotunda. Leaves lanceolate, pekoled, root clustered; florets mixed blue, purple, white and red. A native of India. It is generally said to be the zedoary of the shops; but erroneously: the name zedoary being the Amomum Zedoaria. See AMOMUM.

KAHLER (John), professor of poetry, mathematics, and theology, at Rinletz, and the author of some dissertations on theological and philosophical subjects, was a native of Hesse Cassel, and died in 1729, aged 80.

KAISARTEH, or KAISARIJAH, a town of Asiatic Turkey, in the province of Caramania, and capital of a sangiacat; situated at the foot of a mountain, always covered with snow, about a league and a half, or two leagues in circumference, surrounded with walls, and defended by a castle. It is populous, divided into 180 quarters, in each of which is a mosque, or chapel. The Greeks have a metropolitan and one other church, and the Armenians have three. The principal trade is in Morocco leather. It was known to the ancients under the name of Mazaca, and afterwards that of Cesarea of Cappadocia: 150 miles N. E. of Cogni, and 250 E. S. E. of Constantinople.

KA'JEPUT OLEUM. See CAJEPUT *Oil*.

KA'INSI, the Hottentot name of a species of Antelope. See CAPRA.

KALE (William), a Dutch painter, born in 1630, and died in 1693. His usual subjects were vases of gold, silver, or crystal, gems, glasses, and agates, painted with delicacy, and an extraordinary lustre.

KA'LE, in botany. See BRASSICA.

KA'LE, *Sea*. In botany. See CRAMBE.

KA'LENDAR. See CALENDAR.

KA'LENDS. See CALENDS.

KA'LI, in botany. See SALSOLA.

KA'LI, *Egyptian*. See MESEMBRYANTHAMUM.

KA'LI *Sal*. See SALICORNIA.

KA'LI. (*Kali, n. ind.* from *kali* Arabian.) The kali of the pharmacopoeias is the vegetable alkali, or potash. See also ALKALI VEGETABLE and MINERAL, BARILLA, NATRON, POTASH, &c.

KA'LI ACETATUM. (*Terra foliata tartari. Tartarus regeneratus. Arcanum Tartari. Sal diureticus.* A useful diuretic, deobstruent, and eccoprotic preparation of potash.) In the new chemical nomenclature it is called *acetis potassæ*. Externally it is applied dissolved in vinegar to inflammatory swellings of the testicles and other indolent tumours. Internally it is exhibited in physconia abdominalis, pituitous affections of the primæ viæ, rheumatisms, dropsies, jaundice, intermittent fevers, hæmorrhoids, and dysury.

K. *Citrátum. Alkali volatile, succo citri saturatum.* This neutral saline liquor, a citrat of potash, is made by saturating prepared kali with lemon juice. It is the base of the saline draught; it possesses nervine and sudorific properties; and is exhibited in rheumatism, catarrh, and most febrile diseases.

K. *Purum. Alkali vegetabile fixum causticum.* Caustic vegetable alkali. This pre-

paration of kali is violently caustic, destroying the living animal fibre with great energy. See ALKALI CAUSTIC.

K. *Præparātum. Sal absynthii. Sal Tartari. Sal plantarum. Alkali vegetabile fixum. Carbonas potassæ crystallisatus.* This preparation of potash is in general use to form the kali citratum for the saline draughts. A scruple is commonly directed to be saturated with lemon juice. In this process the kali preparatum, which is a salt composed of potash and carbonic acid, is decomposed. The citric acid having a greater affinity for the potash than the carbonic, seizes it and forms the kali citratum, whilst the carbonic acid flies off in the form of air. The kali preparatum possesses antacid virtues, is an antidote against white arsenic, and may be exhibited with advantage in convulsions and other spasms of the intestines arising from acidity, in calculous complaints, leucorrhœa, scrophula, and aphthous affections.

K. *Sulphurātum.* See HEPAR SULPHURIS.

K. *Tartarisātum. Tartarum solubile. Tartaris tartarisatus: Sal vegetabilis. Alkali vegetabile tartarisatum.* Diuretic, deobstruent, and eccoprotic virtues are attributed to this preparation, which is a tartrite of potash.

K. *Vitriolātum. Alkali vegetabile vitriolatus. Sal de duobus. Arcanum duplicatum. Sal polychrestus. Nitrum vitriolatum.* This preparation of potash is called *sulphas potasse* in the new chemical nomenclature. Its virtues are cathartic, diuretic, and deobstruent; with which intentions it is administered in a great variety of diseases, as constipation, suppression of the lochia, fevers, jaundice, dropsies, milk tumours, &c.

KALISCH, or KALITZ, a city of Poland, and capital of a palatinate of the same name, in what is called Great Poland, or Western Prussia, on the river Prosna, surrounded with morasses, walls, and towers. In the year 1655, this town was taken by the Swedes, and near it, in the year 1706, the Swedish army and their general, Mardefield, were totally defeated and taken prisoners, by the confederates, under the command of Augustus II. king of Poland. This palatinate is also called the Palatinate of Guesen, from the city of that name: 57 miles N. E. of Breslau, and 154 S. of Dantzick. Lon. 18. 0. E. Lat. 51. 52. N.

KALM, a mountain of European Turkey, in the republic of Ragusa: 12 miles N. of Ragusa.

KA'LMIA. American ivy-tree. American dwarf-laurel. In botany, a genus of the class decandria; order monogynia. Calyx five-parted; corol salver-shaped; with the border five-horned underneath; capsule five-celled. Four species.

1. K. latifolia. Broad-leaved kalmia. Leaves ovate-elliptic, ternate and scattered; corymbs terminal. A beautiful shrub rising from six, sometimes to ten or twelve feet high: the flowers are white stained with purplish red. A native of Carolina and Virginia. The honey secreted from this and the ensuing species is poisonous: the bees however are very fond of it and do not appear to be affected by it; but their own honey still retains the original bane and often proves fatal to those who eat largely of it.

2. K. augustifolia. Narrow-leaved kalmia. Leaves lanceolate, permanent; flowers in lateral corymbs, of a pale-blue tint, and becoming still paler with their age; the shrub rises to nearly sixteen feet. A native of North America.

3. K. hirsuta. Bristly kalmia. Leaves opposite and alternate, elliptic, hairy, peduncles axillary, one-flowered, a native of Carolina.

4. K. glauca. Glaucous kalmia. Leaves opposite, oblong, smooth, glancous underneath, revolute at the edge; corymbs terminal; branchlets two-edged, a native of Newfoundland.

KALMUCS, a tribe of Tartars called also Eluths, inhabiting the larger half of what the Europeans call Western Tartary. Their territory extends from the Caspian sea, and the river Yaik or Ural, in 72 degrees of longitude from Ferro, to mount Altay, in 110 degrees, and from the 40th to the 52d degree of north latitude: whence it may be computed about 1930 miles in length from west to east, and in breadth from north to south about 650 miles where broadest. It is bounded on the north by Russia and Siberia, from which it is separated by a chain of mountains; on the east by mount Altay; on the south by the countries of Karazm and the two Bukharias, from which it is also separated partly by a chain of mountains and partly by some rivers. See TARTARY.

Of the Kalmuc Tartars a curious account is given by professor Pallas: They are in general, says he, of a middle size, and it is even rare to see among them a person that is tall; the women especially are of low stature, and have very agreeable features. Their limbs are neatly turned, and very few have any defects contracted in infancy. Their education, being left solely to nature, procures for them a well-formed body and sound constitution. The only defect which is common among them is their having the thighs and legs somewhat bent. A fat person is hardly ever to be met with; the richest and most distinguished, though they lead a life sufficiently indolent, and enjoy abundance of every thing they desire, are never excessively corpulent. Their skin is pretty fair, especially when young; but it is the custom of the lower sort to allow their male children to go quite naked both in the heat of the sun and in the smoky atmosphere of their felt huts: the men too sleep naked, covered only with their drawers; and from these

circumstances they acquire that yellowish-brown colour which characterises them. The women, on the contrary, have a very delicate complexion; among those of a certain rank are found some with the most beautiful faces, the whiteness of which is set off by the fine black of their hair; and in this as well as in their features they perfectly resemble the figures in Chinese paintings.

The physiognomy which distinguishes the Kalmucs is pretty generally known. Strangers are made to believe that it is frightfully deformed; and though indeed there are very ugly men to be found, yet in general their countenance has an openness in it that bespeaks a mild, a frank, and social disposition. In many it is of a roundish shape, and exceedingly agreeable; among the women some would be thought beauties even in those European cities where the taste is most scrupulous. The characteristic features of a Kalmuc or Mongul countenance are the following; The interior angle of the eye is placed obliquely downwards towards the nose, and is acute and fleshy; the eyebrows are black, narrow, and much arched; the nose is of a structure quite singular, being generally flat and broken towards the forehead; the cheek-bone is high, the head and face very round; the eye is dark, the lips thick and fleshy, the chin short, and the teeth exceedingly white, continuing so to old age; the ears are of an enormous size, standing out from the head. These characters are more or less visible in each individual; but the person that possesses them all in the highest degree is considered as the most beautifully formed.

Amongst all the Mongul nations, the men have much less beard than in our European countries, and among the Tartars it appears much later. The Kalmucs have most of it; and yet even with them the beard is very scanty and thin, and few have much hair on any other part of the body.

The Kalmucs are exceedingly social and affable. When a troop of Kalmucs, perceive any person at a distance, it is customary for them to detach one of their number to the next eminence, from whence he makes a signal with his cap for the person to draw near. If this signal is not obeyed, the person is considered as an enemy or a robber, and is often pursued as such. They enter willingly into friendships: but these connexions are not quite disinterested; for to give and to receive presents are with them essential articles. A mere trifle, however, is sufficient to induce them to do you all manner of service; and they are never ungrateful as far as they are able. Adversity cannot deprive them of courage, nor alter their good humour. A Kalmuc will never beg if he were in the extremest misery, but rather endeavour to acquire a subsistence by cheating: and when no other way remains, he will hire himself to some rich individual of his nation, or to some Russian, either as a herdsman, a fisherman, or for any other sort of labour. Very few of the rich value themselves much upon their wealth; but those who do, show no contempt for the poor of their own nation; though the meaner sort pay their court very obsequiously to the rich, who are always surrounded with a swarm of idle dependants.

Nothing can be more prudent than that exercise of hospitality practised by wandering nations; it is of the greatest advantage to those among them who travel across their deserts; and each individual who practises it, may rely on reaping the benefit of it wherever he goes. A Kalmuc provided with a horse, with arms and equipage, may ramble from one place to another for three months together, without taking with him either money or provisions. Wherever he comes he finds either distant relations or friends to whom he is attached by the ties of hospitality, from whom he meets with the kindest reception, and is entertained in the best manner their circumstances afford. Perhaps he lodges in the first unknown cottage he finds upon his road; and scarcely has he entered it, but his wants are supplied with the most affectionate cordiality. Every stranger, of whatsoever nation, never fails to be well received by a Kalmuc; and he may depend upon having his effects in the greatest security the moment he has put himself under the protection of his host: for, to rob a guest, is considered by the Kalmucs as the most abominable of all crimes.

The riches of the Kalmucs, and their whole means of subsistence, depend on their flocks, which many of them reckon by hundreds and even by thousands. A man is thought capable of living on his possessions when he is master of ten cows with a bull, eight mares with a stallion. The animals they have in greatest abundance are horses, horned cattle, and sheep. Camels, which it requires time and pains to rear, cannot multiply much with them: they are besides too delicate; and it is only the rich or the priests who possess any of them. Camels' milk is thick, unctuous, and of a saltish taste, especially when the animals frequent pastures abounding with saline plants; and this last property makes the Kalmucs fond of it to tea. They make use of the hair for stuffing cushions, and for making ropes, packthread, and felt. It may be wrought into the most beautiful camlets, or into the finest and softest cloths. The camels with two bunches are a very uneasy seat to the person who mounts them; their trot is so heavy, and even their walk so rude, that he receives the most violent shocks at every step.

When a Kalmuc horde intends to remove in search of fresh pasture, which in summer necessarily happens every four, six, or eight

days, people are in the first place dispatched to reconnoitre the best place for the khan or prince, for the lama, and for the huts containing the idols. These begin the march, and are followed by the whole troop, each choosing for himself the place he thinks most convenient. The camel that is loaded with the most precious furniture is decorated with little bells; the rest march in a string one behind another, and the bulls with burdens are driven on before. On these days the women and girls dress themselves in their best clothes, and lay on abundance of paint. They have the charge, together with the boys, of leading the flocks and the beasts of burden; and on the road they beguile the tediousness of the journey with their songs.

The Kalmucs are supplied by their flocks with milk, cheese, butter, and flesh, which are the principal articles of their food. With regard to the last, they are so little squeamish, that they not only eat the flesh of their own diseased cattle, but that of almost every sort of wild beast; and the poor will even feed upon carrion. They eat, however, the roots and stalks of many plants; such as the bulbous-rooted chervil and dandelion, &c. which they use both boiled and raw.

Their ordinary drink is the milk of mares or cows; but the former is for several reasons preferred. This, when fresh, has indeed a very disagreeable taste of garlic: but beside that it is much thinner than cow-milk, it takes as it grows sour a very agreeable vinous flavour; it yields neither cream nor curd, but furnishes a very wholesome refreshing beverage, which sensibly inebriates when taken to excess. They never make use of new milk, and still less of milk or of water that has not been boiled. Their milk is boiled as soon as it is taken from the animal; when it is cold, it is poured into a large leathern bag, in which there remains as much of the old milk as is sufficient to turn the new quantity sour, for they never think of cleansing those bags; and as the inside is lined with a crust deposited by the caseous part of the milk and other impurities, it is easy to imagine that a nauseous smell must exhale from them. But this is precisely the circumstance in which the secret consists of communicating to the milk a vinous fermentation.

In summer, and as often as the Kalmucs procure much milk from their flocks, they never fail to intoxicate themselves continually with the spiritous liquor which they know how to distil from it. Mares-milk is the most spiritous; and the quantity meant to be distilled remains twenty-four hours in summer, and three or four days in winter, in those corrupted bags we mentioned, to prepare it for the operation. The cream is left, but the butter which forms at top is taken off and reserved for other purposes. Cows-milk yields one-thirtieth part, and mares-milk one-fifteenth part of spirit. This liquor is limpid and very watery, and consequently does not take fire, but is capable of being long kept in glass-bottles. The rich Kalmucs increase its strength by a second distillation.

These people are exceedingly fond of tea and tobacco. The former is so dear, as it comes to them from China by the way of Russia, that the poor people supply its place with various wild plants; such as a species of liquorice, the seed of the sharp-leaved dock, the roots of wild angelica, and the seed of the Tartarian maple.

The Kalmucs are excellent horsemen. Their arms are lances, bows and arrows, poniards, and crooked sabres, though the rich have fire-arms. They wear, when at war, coats of mail, which cost 50 horses, and their helmets are gilded at top. They are fond of falconry, and hunting of all sorts is their principal amusement. Their passion for play, especially with those who play cards, is carried to as great excess among them as in any other nation.

The greater part of their time is spent in diversions; and however miserable their manner of life may seem to us, they are perfectly happy with it. They cannot endure for any time the air of a close room; and think our custom of living in houses insupportable. The greatest part of them, notwithstanding the apparent unhealthiness of their way of life, arrive at a vigorous old age; their diseases are neither frequent nor dangerous. Men of 80 or 100 years old are not uncommon; and at that age they can still very well endure the exercise of riding. Simple food, the free air which they constantly breathe, a hardy vigorous constitution, continual exercise without severe labour, and a mind free from care, are the natural causes of their health and longevity.

It is very remarkable, that a migratory people, whose manner of life seems so congruous to the natural liberty of mankind, should have been subjected from time immemorial to the unlimited authority of an absolute sovereign. The Monguls of Asia afford the only instance of it; for neither written records nor ancient tradition have preserved the smallest trace of their ever having enjoyed a state of independence. On the contrary, they acknowledge that they have at all times been subject to khans and princes, whose authority has been transmitted to them by succession, and is considered as a right perfectly established, sacred, and divine.

KALNICK, a strong town of Poland, in the palatinate of Bracklaw. E. lon. 29. 8. N. lat. 48. 57.

KALO, or Kaloo, a town of Upper Hungary, seated in a lake, 22 miles S. E. of Tockay. E. lon. 21. 54. N. lat. 47. 56.

KALUGA, a government of the Russian empire, formerly a province in the govern-

ment of Moscow. It contains 12 districts, and its principal town, of the same name, is seated on the river Occa.

KAM. *a.* Crooked (*Shakspeare*).

KAMAKURA, an island of Japan, situated near the south coast of Niphon, scarcely more than a league in circumference; the coasts are so sharp that a crane is made use of to raise the freight from the boats. It is used as a state prison.

KAMINIEC, a town of Poland, and capital of the palatinate of Podolia, with a castle, built on a rock; but more beholden to nature than art for its strength. However, it is one of the best fortifications in Poland. A little below it runs the river Smetricz, which falls into the Dniester. A Popish and an Armenian bishop, and a Castellan, reside in this city; and a court of justice and provincial diet are also held here. This Episcopal see was founded in the year 1375. Here is also a college, which formerly belonged to the Jesuits. In 1651, the Cosacs laid seige to the castle of Kaminiec, but without success. In 1672, the Turks obliged it to surrender, and held it till the peace of Carlowitz, which was concluded in 1699. The whole province is sometimes called Kaminiec: 100 miles W. Braclaw. Lon. 26. 30. E. Lat. 48. 58. N.

KAMISS, an agreeable acescent liquor, prepared by the Tartars from mare's-milk, and of high repute in many parts of Russia. The following is the process as obtained by Grieve from the Beschkir Tartars. Take any quantity of fresh mare's-milk, add to it one sixth part of water, and pour the mixture into a wooden vessel. Use then as a ferment one eighth of the sourest cow's-milk, but a small portion of old kamiss is best; cover the vessel with a thick cloth, and place it in a moderate temperature; when, on reposing twenty-four hours, a thick substance will be collected on the surface, which is to be beaten with a stick until it is ultimately mixed with the fluid part. After reposing another twenty-four hours it is put into a narrow vessel, and stirred till perfectly homogeneous. This is the state in which it is called Kamiss, and has an agreeable taste, which is a compound of sweet and sour. It is stirred every time it is used. Grieve was told that if this be put into close vessels, in a cool place, it will keep three months or more.

The Arabs and Turks make a similar preparation; the former calling it *leban*, the latter *yaourt*.

From kamiss the Tartars also extract an ardent spirit by distillation, and have certainly done so as long as the thirteenth century, since it is noticed by Mano Paolo; to which spirit they give the name of arti or ariti. Pallas confirms this account; and a dissertation upon the subject was published by Lepectin and other academicians at Strasburg in 1778. From this we learn also that the Tartars, in default of mare's-milk, employ cows, though they always prefer the former: the milk must be employed for this purpose with all its constituent parts; for it has been ascertained that when deprived of its butter, or caseous part it gives little or no spirit.

KAMSIN, the name of a hot southerly wind, common in Egypt, of which we find the following description in M. Volney's Travels.—These winds, says he, are known in Egypt by the general name of winds of 50 days; not that they last 50 days without intermission, but because they prevail more frequently in the 50 days preceding and following the equinox. Travellers have mentioned them under the denomination of poisonous winds, or, more correctly hot winds of the desert. Such in fact is their quality; and their heat is sometimes so excessive, that it is difficult to form any idea of its violence without having experienced it; but it may be compared to the heat of a large oven at the moment of drawing out the bread. When these winds begin to blow, the atmosphere assumes an alarming aspect. The sky, at other times so clear in this climate, becomes dark and heavy; the sun loses his splendour, and appears of a violet colour; the air is not cloudy, but grey and thick, and is in fact filled with an extremely subtile dust, which penetrates every where. This wind, always light and rapid, is not at first remarkably hot, but it increases in heat in proportion as it continues. All animated bodies soon discover it by the change it produces in them. The lungs, which a too rarefied air no longer expands, are contracted, and become painful. Respiration is short and difficult; the skin parched and dry, and the body consumed by an internal heat. In vain is recourse had to large draughts of water; nothing can restore perspiration. In vain is coolness sought for; all bodies in which it is usual to find it deceive the hand that touches them. Marble, iron, water, notwithstanding the sun no longer appears, are hot. The streets are deserted, and the dead silence of night reigns every where. The inhabitants of towns and villages shut themselves up in their houses, and those of the desert in their tents or in wells dug in the earth, where they wait the termination of this destructive heat. It usually lasts three days, but if it exceeds that time it becomes insupportable. Woe to the traveller whom this wind surprises remote from shelter! He must suffer all its horrible effects, which sometimes are mortal. The danger is most imminent when it blows in squalls; for then the rapidity of the wind increases the heat to such a degree as to cause sudden death. This death is a real suffocation; the lungs being empty are convulsed, the circulation is disordered, and the whole mass of blood driven by the heat towards the head and breast; whence the hæmorrhage at the nose and mouth which happens after death. This wind is especially destructive to per-

sons of a plethoric habit, and those in whom fatigue has destroyed the tone of the muscles and the vessels. The corpse remains a long time warm, swells, turns blue, and soon becomes putrid. These accidents are to be avoided by stopping the nose and mouth with handkerchiefs; an efficacious method likewise is that practised by the camels. On this occasion these animals bury their noses in the sand, and keep them there till the squall is over. Another quality of this wind is its extreme aridity; which is such, that water sprinkled on the floor evaporates in a few minutes. By this extreme dryness it withers and strips all the plants; and by exhaling too suddenly the emanations from animal bodies, crisps the skin, closes the pores, and causes that feverish heat which is the constant effect of suppressed perspiration.

KAMTCHATKA, a peninsula of Russia, in the government of Irkutsk, bounded on the north by the province of Ochotsk, on the east and south by the Northern Pacific Ocean, and on the west by the Sea of Ochotsk and the Penzinkoe Gulf; about 600 miles in length, and from 30 to 200 in breadth. Captain King, who visited it in the year 1779, gives a description of the country, of which the following is an extract:—Its southern extremity is Cape Loparka, a word signifying the blade bone of a man, and is so called from its supposed resemblance to it. The shape of the whole peninsula is not unlike that of a shoe, widening from the toe (which we may suppose to be Cape Lopatka, toward the middle, and narrowing again toward the heel, a neck of land connecting it with the continent. A chain of high mountains stretches the whole length of the country, from north to south, dividing it nearly into two equal parts, from whence a great number of rivers take their rise, and empty themselves on each side, into the Pacific Ocean and the Sea of Ochotsk. The soil is barren, with not the smallest spot of ground that resembles what is called in England a good green turf; or that seemed as if it could be turned to any advantage either in the way of pasturage, or other mode of cultivation. The face of the country in general was thinly covered with stunted trees, having a bottom of moss, mixed with low weak heath. The whole bore a more striking resemblance to Newfoundland than to any other part of the world I had ever seen. It must, however, be observed, that I saw at Paratounca three or four stacks of very sweet and very fine-looking hay; and Major Behm informed me, that many parts of the peninsula, particularly the banks of the river Kamtchatka, and the Bistraia, produce grass of great height and strength, which they cut twice in the summer; and that the hay is of a succulent quality, and particularly well adapted to the fattening of cattle. It is natural to suppose, that the severity of the climate must be in due proportion to the general sterility of the soil, of which it is probably the cause. The first time we saw this country was in the beginning of May, 1779, when the whole face of it was covered with snow, from six to eight feet deep. On 15th of June, the thermometer had never risen higher than 58°, nor the barometer than 30, 4. The winds blew most invariably from the eastward during our stay, and the south-east was more prevalent than any other. On our return, the 24th of August, the foliage of the trees, and all other sorts of vegetation, seemed to be in the utmost state of perfection. For the remainder of this month and through September, the weather was very changeable, but in no respect severe. But at the beginning of October, the tops of the hills were again covered with new-fallen snow, the wind continuing westerly. In computing the seasons, the spring ought certainly not to be taken into the account. From the middle of June to the middle of September, may be properly said to constitute the summer. October may be considered as an autumnal month; from thence, till the middle of June, it is perfect winter. This peninsula abounds in volcanos, of which only three have, for some time past, been subject to eruptions. The country is likewise said to contain numerous springs of hot water. Of the trees which fell under our notice, the principal are the birch, the poplar, the alder (with the bark of which they stain their leather), many species of the willow, but all small, and two sorts of dwarfish pines or cedars. One of these grows upon the coast, creeping along the ground, and seldom exceeds two feet in height. It was of this sort we made our essence for beer, and found it most excellent for the purpose. The birch was by far the most common tree we saw; and of this we remarked three sorts. Two of them fit for timber, and differing only in the texture and colour of the bark; the third of a dwarfish kind. Of the shrub kind, as juniper, the mountain-ash, wild rose-trees, and rasberry-bushes, the country produces great abundance; together with a variety of berries; blue-berries of two sorts, round and oval, partridge-berries, cran-berries, crow-berries, and black-berries. These the natives gather at proper seasons, and preserve by boiling them into a thick jam, without sugar. They make no inconsiderable part of their winter provisions, and are used as sauce to their dried and salt fish; of which kind of food they are unquestionably excellent correctives. They likewise eat them by themselves, in puddings, and various other ways, and make decoctions of them for their ordinary liquor. We met with several wholesome vegetables in a wild state, and in great quantities, such as wild celery, angelica, chervil, garlic, and onions. Upon some few patches of ground, in the vallies, we found excellent turnips, and turnip-radishes. There are two plants, which, from the great use

made of them, merit a particular mention. The first, called by the natives the saranne. The plant grows wild, and in considerable abundance: the women are employed in collecting the roots, which are of the bulbous kind, at the beginning of August, which are afterwards dried in the sun, and then laid up for use. It is used in cookery in various ways. When roasted on embers it supplies the place of bread, better than any thing the country affords. After being baked in an oven, and pounded, it becomes an excellent substitute for flour and meal of every sort, and in this form is mixed in all their soups, and most of their other dishes. It is esteemed extremely nourishing; has a pleasant bitter taste, and may be eaten every day without cloying. We used to boil these roots, and eat them as potatoes, either alone, or with our meat, and found them very wholesome and pleasant. The other plant alluded to, is called the sweet grass. This plant was formerly a principal ingredient in the cookery of most of the Kamtchadal's dishes; but since the Russians got possession of the country, it has been almost entirely appropriated to the purpose of distillation. The liquor is of the strength of brandy; and is called by the natives raka, Two poods (seventy-two pounds) of the plant yield generally one vedro (twenty-five pints) of raka. The nettle, as the country produces neither hemp nor flax, supplies the materials of which are made their fishing-nets; and without which they could not possibly subsist. For this purpose, they cut it down in August; and after hanging it up in bundles in the shade, under their balagans, the remainder of the summer, treat it like hemp. They then spin it into thread with their fingers, and twist it round a spindle, after which they twine several threads together, according to the different purposes for which it may be designed. Though there is little doubt but that many parts of this peninsula would admit of such cultivation as might contribute considerably to the comfort of the inhabitants, yet its real riches must always consist in the number of wild animals it produces; and no labour can ever be turned to so good account as what is employed upon their furreries. The animals, therefore, which supply these, come next to be considered; and these are, the common fox; the stoat, or ermine; the sable; the arctic fox; the varying hare; the mountain rat, or earless marmot; the weasel; the glutton, or wolverine; the argali, or wild sheep; rein-deer; bears; wolves; dogs. The coast and bays of this country are frequented by almost every kind of northern sea-fowl; and among the rest are the sea-eagles, but not, as at Oonalaska, in great numbers. The rivers inland (if I may judge from what I saw in our journey to Bolcheretsk) are stored with numerous flocks of wild ducks of various species: in the woods through which we passed, were seen eagles of a prodigious size: this country likewise affords woodcocks, snipes, and two sorts of grouse, or moor game. Swans are also said to be in great plenty. Fish may be considered as the staple article of food with which Providence hath supplied the inhabitants of this peninsula; who, in general, must never expect to draw any considerable part of their sustenance either from grain or cattle. The present inhabitants of Kamtchatka are of three sorts. The natives, or Kamtchadales; the Russians and Cosacks; and a mixture of these two by marriage. Mr. Steller, who resided some time in this country, and seems to have taken great pains to gain information on this subject, is persuaded, that the true Kamtchadales are a people of great antiquity, and have for many ages inhabited this peninsula; and that they are originally descended from the Mungalians, and not either from the Tongusian Tartars, as some, or the Japanese as others, have imagined. Volodimir Atlassoff, a Cosack, stands for the first acknowledged discoverer of Kamtchatka. This person was sent, in the year 1697, from the fort Yakutsk, to the Anadirsk, in the quality of commissary, with instructions to call in the assistance of the Koriacs, with a view to the discovery of countries beyond their's, and to the subjecting them to a tribute. In 1699, he penetrated, with about sixty Russian soldiers, and the same number of Cosacks, into the heart of the peninsula, gained the Tigil, and from thence, levying a tribute in furs in his progress, crossed over to the river Kamtchatka, on which he built the higher Kamtchatka ostrog, called Verchnei, where he left a garrison of sixteen Cosacks, and returned to Yakutsk in 1700, with an immense quantity of rare and valuable tributary furs. The Russian government established over this country is mild and equitable, considered as a military one, in a very high degree. The natives are permitted to choose their own magistrates from among themselves, in the way, and with the same powers, they had ever been used. One of these, under the title of toion, presides over each ostrog; is the referee in all differences; imposes fines, and inflicts punishments for all crimes and misdemeanors; referring to the governor of Kamtchatka such only as he does not choose from their intricacy or heinousness to decide upon himself. The toion has likewise the appointment of a civil officer, who is called a corporal, who assists him in the execution of his office, and in his absence acts as his deputy. By an edict of the late empress no crime whatsoever can be punished with death. But we were informed, that in cases of murder (of which there are very few) the punishment of the knout is administered with such severity, that the offender, for the most part, dies under it. The only tribute exacted (which can be considered as little more than an acknowledgment of the Russian dominion over them) con-

sists, in some districts, of a fox's skin, in others of a sable's, and, in the Kurile Isles, of a sea-otter's; but as this is much the most valuable, one skin serves to pay the tribute of several persons. The toions collect the tribute in their respective districts. Besides the mildness of their government, the Russians have a claim to every praise for the pains they have bestowed, and which have been attended with great success, in converting them to Christianity, there remaining at present, very few idolaters among them. The religion taught is that of the Greek church. Schools are likewise established in many of the ostrogs, where the children of both the natives and Cossacks are gratuitously instructed in the Russian language. The commerce of this country, as far as concerns the exports, is entirely confined to furs, and carried on principally by a company of merchants, instituted by the empress. The articles of importation are principally European, but not confined to Russian manufactures; many are English and Dutch; several likewise come from Siberia, Bukharia, the Calmucs, and China. They consist of coarse woollen and linen cloths, yarn stockings, bonnets, and gloves; thin Persian silks, cottons, and pieces of nankeen, silk and cotton handkerchiefs, brass coppers and pans, iron stoves, files, guns, powder and shot; hardware, such as hatchets, bills, knives, scissars, needles, looking-glasses flour, sugar, tanned hides, boots, &c. There are six vessels (of forty to fifty tons burthen) employed by the empress between Ochotzk and Bolcheretsk; five of which are appropriated to the transporting of stores and provisions from Ochotsk to Bolcheretsk; except that once in two or three years some of them go round to Awatska, and the Kamtchatka river; the sixth is only used as a packet-boat, and always kept in readiness, and properly equipped for conveying dispatches. Long. 176. 48. to 180. 50. E. Ferro. Lat. 51. 10. to 61 N. according to the Russian map; according to captain King, the Long. of the southern extremity 156. 45. Greenwich. Lat. 52. to 61. N.

KAMTCHATKA, a river of Russia, in the peninsula of Kamtchatka, which runs into the North Pacific Ocean, twenty miles S. Lower Kamtchatskoi.

KAMTCHATSKOI, a cape of Russia, on the east coast of Kamtchatka: forty miles E. Niznei Kamtchatskoi.

Kamtchatskoi (*Niznei*, or *Lower*), a town of Russia, in the peninsula of Kamtchatka, where there are barracks and an hospital: 184 miles NNE. Verchnei Kamtchatskoi. Lon. 178. E. Ferro. Lat. 56. 40. N.

Kamtchatskoi (*Verchnei*, or *Upper*), a town of Russia, in the peninsula of Kamtchatka: sixty miles NNE. Bolchoretzkoi. Lon. 175. 25. E. Ferro. 53. 50. N.

KAN, or Khan, the name of an officer in Persia, answering to that of governor in Europe. Thus the Persians have kans of provinces, &c.

KANDEL Indian: in botany, khisophora.

KANGAROO, or Kanguroo, in Mastiology. See Macropus.

KANIOW, a strong town of Poland, in the Ukraine, and in the palatinate of Kiow. It is near the river Dnieper, 62 miles S. by E. of Kiow, and 100 N. E. of Bracklaw.

KANISCA, a strong town of Lower Hungary, capital of the county of Salawar. It was taken by the Imperialists in 1690, and is seated on the river Drave, 54 miles S. W. of Alba Regalis, and 100 S. by E. of Vienna. Long. 17. 40. E. Lat. 46. 43. N.

KAN-TCHEOU-FOU, a flourishing town of China, in the province of Kiang-si. Its rivers, port, riches, and population, all contribute to attract strangers. A day's journey from this city is a very rapid current, almost twenty leagues in length, which flows with great impetuosity over a number of scattered rocks that are level with the water. Travellers here are in great danger of being lost, unless they take care to be conducted by one of the pilots of the country: after this passage, the river becomes twice as large as the Seine at Rouen; it is continually covered with loaded barks and other vessels under sale. Near the walls of the city is a very long bridge, composed of one hundred and thirty boats joined together by strong iron chains. The custom-house is upon this bridge, where a receiver constantly resides to visit all barks, and examine if they have paid the duties imposed on the commodities with which they are loaded. Two or three moveable boats are so placed, that by their means the bridge can be opened or shut, to give or refuse a passage; and no barks are ever permitted to pass until they have been examined. In the territory belonging to this city, grow a great number of those valuable trees from which varnish distils. Its district is extensive, and contains twelve cities of the third class.

KANT, Immanuel, an eminent German metaphysician, and most voluminous writer; was born at Konigsberg, April 22, 1724, and educated first at the college Fridericianum, and afterwards at the university of Konigsberg. He lived to attain the age of eighty; dying Feb. 12, 1804; but his life was marked with few vicissitudes, and signalized by few events, except those which determined the publication of his different productions, and his election to the professorship of logic and metaphysics in the university of Konigsberg. His first treatise appeared at Konigsberg in 1746, 8vo. pp. 220, in the German language, with two plates. In this juvenile production, which is modestly entitled Reflections, he successively combats the hypotheses of Leibnitz and Descartes; the former of whom had introduced the simple proposition, "that the mere velocity of bodies, even such as are in

actual motion, serves as a rule for ascertaining their power;" and the latter had erroneously adopted the square of velocities in such computation. At this time, Kant was in the twenty-second year of his age. After an interval of nine years, he published his General History of Nature, or Theory of the Celestial Bodies, founded on Newtonian Principles; dedicated to the late Frederick the Great of Prussia; of which a new and improved edition, by the author, lately appeared in Germany. In the same year, 1755, he completed the following Latin treatises; in which he gave the first specimens of his philosophical and critical talents:—Principiorum metaphysicorum nova elucidatio: and Dissertatio de principiis primis cognitionis humanæ; both 4to. Regiomonti. These were succeeded by his Monadologia Physica, 4to. 1756, Soon after their appearance, Kant presented the world with an ingenious and elaborate History of the most remarkable Events produced by the Earthquake which convulsed an extensive Part of the Globe, towards the Close of the Year 1755; 4to. Konigsberg, 1756.—Next, in the order of time, are his New Theory of Motion and Rest, illustrated with Experiments on this Subject in Natural Philosophy, 8vo. 1758:—Reflections upon Opticism, 4to. 1759:—An Outline of a Course of Lectures on Physical Geography; with an Attempt to solve the Problem, Whether Westerly Winds are, for this Reason, accompanied with Moisture in Prussia; because they blow over an extensive Sea, 4to. Konigsberg, 1759:—Demonstration of the Sophistical Subtlety contained in the four Syllogistic Figures, 8vo. 1762:—An Attempt towards introducing the Proposition of Negative Magnitudes into Philosophy, 8vo. 1763:—Inquiries into the Perspicuity of the Principles relative to Natural Religion and Morals; or, an Essay on the Evidence required in Metaphysical Sciences; being an Answer to the Prize Question proposed by the Royal Academy of Sciences at Berlin, for the Year 1763:—On the only possible Method of proving the Existence of the Deity, 8vo. Konigsberg, 1763:—Observations on the Effect of the Beautiful and the Sublime, 8vo. Konigsberg, 1764:—Dreams of a Ghost-seer (Fanatic), illustrated by Dreams in Metaphysics, 8vo. 1764:—Remarks serving to explain the Theory of Winds, 4to. 1765.—These eleven treatises, last mentioned, are printed in the German language.

After a period of five years, Kant produced the outline of what is now called the Critical System; the principles of which are contained in the following work: De mundi sensibilis atque intelligibilis forma et principiis, 4to. Regiomonti, 1770. His next work was entitled, Prolegomina; or, introductory Observations applicable to every future System of Metaphysics that may deserve the Name of a Science; 8vo. pp. 222; Riga, 1783. This is a concise and perspicuous abstract of the preceding critique in an analytical method, which the author has here adopted, with a view to return by the same path on which he had before advanced synthetically.—Reflections upon the Foundation of the Powers and Methods which Reason is entitled to employ in judging of its Stability; 8vo. Konigsberg, 1784.—Ideas for an Universal History, in a Cosmopolitical View; and Reply to the Question, What is Illumination of Mind? These two essays were originally inserted in the Berlin Monthly Magazine for November and December, 1784.—Fundamental Principles of the Metaphysics of Morals, 8vo. Riga, 1785 (2nd edit. 1792):—On the Volcanoes in the Moon, ibid. for March, 1785:—On the Injustice of printing spurious Editions of Books, ibid. for May, 1785:—Definition of the Idea connected with the Expression, "A Race of Men;" Berlin Monthly Magazine for November, 1785:—On the probable Origin of Human History, ibid. for Jan. 1786:—What is understood by the Expression, to become familiar with the Origin of our Thoughts? ibid. for October, 1786.—Metaphysical Principles of Natural Philosophy, 8vo. Riga, 1786; (2nd edit. 1787. pp. 182):—Some Remarks on Mr. Jacob's Examination of a Work written by M. Mendelssohn, and entitled "Morning Hours," published in 1786, and reprinted in Kant's Miscellaneous Works, vol. III. pp. 89 to 98:—Fundamental Principles of the Critique of Taste, 8vo. Riga, 1787:—A Treatise concerning the use of Theological Principles in Philosophy; published in the German Mercury for January and February, 1788.—Critique of Practical Reason, 8vo. Riga, 1788. 2nd edit. 1792):—On the Failure of all Philosophical Attempts made by Leibnitz, in his work entitled Theodicea; Berlin Monthly Magazine for September, 1791:—On the Radical Evil in Human Nature; ibid. for April, 1792:—On the common-place Assertion, that a Thing may be true in Theory, but is not applicable to Practice; ibid. for September, 1793:—Religion considered within the Limits of mere Reason; Konigsberg, 1793 (2nd edit. enlarged, p.p. 340, 1794):—Some Observations respecting the Influence of the Moon on the Weather; Berlin, Monthly Magazine for May, 1794.—The following treatises having partly appeared in different periodical collections, and partly in distinct publications, we shall merely translate their titles:—On the End or Termination of all Things; 1795:—Epistle to Sommering, respecting the Organ of the Soul; 1796:—On the Peculiarity of the haughty Tone lately raised in Philosophical Discussions; 1796:—Proposals for deciding a Mathematical Dispute which had arisen from Misunderstanding; 1796:—Annunciation of the approaching Conclusion of a Treaty for perpetual Peace in Philosophy; 1796:—On the supposed Right of speaking Falsehood from philanthropic Motives; 1797:—Declaration

on Mr. Schlettwein's literary Challenge directed to Kant; on the 11th of May, 1797:—On the Art of Book-making; in two Letters addressed to M. Frederic Nicolai, the Author and Publisher: 1797:—On the Power of the Mind to overcome morbid Sensations by mere Resolution; in Reply to the Aulic Counsellor and Professor Hufeland; 1797:—Answer to the reiterated Question, Whether the Human Race is in a progressive State of Improvement? 1798.—Contest between the Faculties; namely, 1, between the Theological and Philosophical Faculties; 2. between the Juridical and Philosophical Faculties; and 3, between the Medical and Philosophical Faculties; 1798.

Beside these smaller tracts, Professor Kant has published various other performances, which are not contained in the collection of his miscellaneous works above quoted; and have been separately printed. Of this class are, his Project for a perpetual Peace; a Philosophical Attempt; 8vo. pp. 104; Konigsberg, 1795; and which has also been translated into French and English:—Metaphysical Elements of Jurisprudence; 8vo. pp. 299; Konigsberg, 1797:—Metaphysical Elements of Ethics, or Doctrinal Virtue (*Tugenlehere*); 8vo. Konigsberg, 1797:—Declaration upon Mr. Schlettwine's Challenge in a Letter from Grelfswalde:—On the Power of the Mind in subduing the Sensations of Pain:—In 1798, On Book making, in two Letters to Mr. Frederick Nicolai:—Question renewed, Whether the Human Race is in a continued State of Improvement?—Explanatory Observations on the Civil Law for the Possessors of the first Edition:—The Dispute of the Faculties:—A Pragmatical View of Anthropology. In this latter work he takes an almost formal leave of the public as an author, consigning his papers over to the revision of others. After which he gave up all his official situations, and in consequence of his infirmities retired into perfect solitude. He had now been a writer sixty years, and had written upwards of sixty different works, including those which were afterwards collected from his papers. These were in 1801; Logic, or a Guide to Lecturing:—1802, Physical Geography:—1803, On giving Instruction:—1804, Upon the Prize Question of the Royal Academy at Berlin, What is the actual Progress made in Metaphysical Sciences since Leibnitz and Wolf?

The most prominent feature in Kant's intellectual character, was the accuracy with which he analysed the most complex ideas. Nothing escaped the scrutiny of his intellectual eye. Whatever is perceivable to others in the moral and physical world, became manifest to him. He discovered therefore so easy, the incongruities of other men's sentiments, and traced, with unspeakable precision, their errors to the true source. He had likewise an astonishing faculty of unfolding the most abstruse principles, and digesting single and individual sentiments into a systematic order. Herein consisted the originality of his mind. As to his manner of explaining his own ideas, it was commonly pedantic, and affected; often indeed were his sentiments conveyed in such a strange jargon, that his readers had at once to learn a new language and a new metaphysics.

KANTIAN Philosophy, Kantism, or Critical Philosophy, is the name of a system of metaphysical science, invented by Immanuel Kant: a system which was long generally admired on the continent of Europe, though it now sways a very doubtful sceptre, even in Germany.

Besides employing a vast number of words of his own invention, derived from the Greek language, Kant uses expressions, which have long been familiar to metaphysicians, in a sense different from that in which they are generally received: and hence a large portion of time is requisite to enable the most sagacious mind to ascertain with precision the import of his phraseology.

1. The difficulty of comprehending this philosophy has contributed, we believe, more than any thing else, to bring it into vogue, and to raise the fame of its author. Men are ashamed, after so laborious and fatiguing a study, to acknowledge that all their labour has been thrown away; and vanity prompts almost every man to raise the importance of that branch of science which is understood but by a few, and in which he is conscious that his own attainments have been great. "We acknowledge, however, that in the system of Kant there is displayed much genius, combination, and systematic arrangement; but this only affords one of the many reasons which it presents, for our regretting that the author has not directed his mind to more useful researches, and that he has wasted the strength of his genius in rendering uncertain the most comfortable truths, and in giving the appearance of novelty to opinions for the most part taught long before his day."

2. The following analysis will sufficiently enable any one, at all conversant with metaphysical science, to form a judgment of this celebrated system; and our correspondent, on whose word the reader may rely, assures us, that, in detailing the principles of Kant, he has taken special care to exhibit them with the utmost possible exactness, having several times preferred the obscurity of the author's reasonings and language, to the danger of a false, though more perspicuous, interpretation.

3. "Kant divides all our knowledge into that which is *a priori*, and that which is *a posteriori*. Knowledge *a priori* is conferred upon us by our nature. Knowledge *a posteriori* is derived from our sensations, or from experience; and it is by our author denominated *empyric*. One would at first be induced, by this account of the origin of human knowledge, to believe that Kant intended to revive the system of innate ideas; but we very quickly discover that such is not his system. He considers all our knowledge as acquired. He maintains, that experience is the occasional cause or productrice of all our knowledge; and that without it we could not have a single idea. Our ideas *a priori*, he says, are produced with experience, and could not be produced without it; but they are not produced by

it, or do not proceed from it. They exist in the mind; they are the forms of the mind. They are distinguished from other ideas by two marks, which are easily discerned; *i. e.* they appear universal and necessary; or, in other words, they admit of no exception, and their converse is impossible. Ideas which we derive from experience have no such characters. We can suppose, that we have seen, or felt, or heard once, we may see, or feel, or hear again; but we do not perceive any impossibility in its being otherwise. For instance, a house is on fire in my view: I am certain of this fact, but it affords me no general or necessary knowledge. It is altogether *a posteriori*; the materials are furnished by the individual impression which I have received; and that impression might have been very different.

"But if I take twice two small balls, and learn to call twice two four, I shall be immediately convinced, that any two bodies whatever, when added to any two other bodies, will constantly make the sum of bodies four. Experience has indeed afforded me the opportunity of acquiring this knowledge; but it has not given it to me; for how could experience prove to me that this truth shall never vary? Experience must always be limited; and therefore cannot teach us that which is necessary and universal. It is not experience which discovers to us, that we shall always have the surface of the whole pyramid by multiplying its base by the third part of its height; or that two parallel lines, extended *in infinitum*, shall never meet.

"All the truths of pure mathematics are, in the language of Kant, *a priori*. Thus, that a straight line is the shortest of all possible lines between two fixed points; that the three angles of a triangle are always equal to two right angles; that we have the same sum, whether we add 5 to 7 or 7 to 5; and that we have the same remainder when we subtract 5 from 10 as when we subtract 10 from 15—are so many propositions, which are true *a priori*.

4. "Pure knowledge *a priori*, is that which is absolutely without any mixture of experience. Two and two men make four men, is a truth, of which the knowledge is *a priori*; but it is not pure knowledge, because the truth is particular. The ideas of substance, and of cause and effect, are *a priori*; and when they are separated from the objects to which they refer (we suppose from this or that particular object), they form, in the language of Kant, void ideas. It is our knowledge *a priori*, i. e. that knowledge which precedes experience as to its origin, which renders experience possible. Our faculty of knowledge has an effect on our ideas of sensation analogous to that of a vessel, which gives its own form to the liquor with which it is filled. Thus, in all our knowledge *a posteriori*, there is something *a priori* derived from our faculty of knowledge. All the operations of our minds; all the impressions which our external and internal senses receive and retain, are brought into effect by the conditions, the forms, which exist in us by the pure ideas *a priori*, which alone render all our other knowledge certain.

5. "Time and space are the two essential forms of the mind; the former for impressions received by the internal sense; the second for those received by our external senses. Time is necessary in all the immediate (perhaps intuitive) perceptions of objects; and space in all external perceptions.

6. "Extension is nothing real but as the form of our sensations. If extension were known to us only by experience, it would then be possible to conceive that there might be sensible objects without space.

7. "It is by means of the form space that we are enabled, *a priori*, to attribute to external objects impenetrability, divisibility, mobility, &c.; and it is by means of the form time that we attribute to any thing duration, succession, simultaneity, permanence, &c.

8. "Arithmetic is derived from the form of our internal sense, and geometry from that of our external.

9. "Our understanding collects the ideas received by the impressions made on our organs of sense, confers on these ideas unity by a particular force (we suppose energy) *a priori*; and thereby forms the representation of each object. Thus, a man is successively struck with the impressions of all the parts which form a particular garden. His understanding unites these impressions, or the ideas resulting from them; and in the unity produced by that unifying act, it acquires the idea of the garden. If the objects which produce the impressions afford also the matter of the ideas, then the ideas are empyric; but if the objects only unfold the forms of the thought, the ideas are *a priori*. The act of the understanding which unites the perceptions of the various parts of an object into the perception of one whole, is the same with that which unites the attribute with its subject.

10. "Judgments are divided into two species; analytic and synthetic. An analytic judgment is that in which the attribute is the mere developement of the subject, and is found by the simple analysis of the perception; as bodies are extended; a triangle has three sides.

11. "A synthetical judgment is that where the attribute is connected with the subject by a cause (or basis) taken from the faculty of knowledge, which renders this connection necessary: as, a body is heavy; wood is combustible; the three angles of a triangle are equal to two right angles. These are synthesis *a priori* and *a posteriori*; and the former being formed by experience, we have the sure means of avoiding deception.

"It is a problem, however, of the utmost importance, to discover how synthetic judgments *a priori* are possible. How comes it, for example, that we can affirm that all the radii of a circle are equal, and that two parallel lines will never meet? It is by studying the forms of our mind that we discover the possibility of making these affirmations. In all objects there are things which must necessarily be thought (be supplied by thought); as, for example, that there is a substance, an accident, a cause, and certain effects.

12. "The forms of the understanding are, quantity, quality, relation, modality.

"Quantity, Kant distinguishes into general, particular, and individual; quality, into affirmation, negation, infinite; relation, into categoric, hypothetic, and disjunctive; and modality, into problematic, certain, and necessary. He adds also to these properties of the four principal forms of the understanding, a table of categories, or fundamental ideas *a priori*.

13. "Quantity, gives unity, plurality, totality. Quality, gives reality, negation, limitation. Relation, gives inherence, substance, cause,

dependence, community, reciprocity. Modality, gives possibility, impossibility, existence, nothing, necessity, accident. These categories can only be applied to experience. When, in the consideration of an object, we abstract all that regards sensation, there remain only the pure ideas of the understanding, or the categories, by which a thing is conceived as a thing.

"Pure reason is the faculty of tracing our knowledge *a priori*, to subject it to principles, to trace it from its necessary conditions, till it be entirely without condition, and in complete unity. This pure reason has certain fundamental rules, after which the necessary connection of our ideas is taken for the determination of the objects in themselves; an illusion which we cannot avoid, even when we are acquainted with it. We can conclude from what we know to what we do not know; and we give an objective reality to these conclusions from an appearance which leads us on.

14. "The writings of Kant are multifarious; but it is in his work entitled the "Critique of Pure Reason," that he has chiefly expounded his system. This work is a treatise on a pretended science, of which Kant's scholars consider him as the founder, and which has for its objects the natural forces, the limits of our reason, as the source of our pure knowledge *a priori*, the principles of all truth. Kant does not propose to give even an exposition of these branches of knowledge, but merely to examine their origin; not to extend them, but to prevent the bad use of them, and to guard us against error. He denominates this science transcendental criticism; because he calls all knowledge, of which the object is not furnished by the senses, and which concerns the kind and origin of our ideas, transcendental knowledge. The "Criticism of Pure Reason," which gives only the fundamental ideas and maxims *a priori*, without explaining the ideas which are derived from them, can lead (says Kant) to a complete system of pure knowledge, which ought to be denominated transcendental philosophy, of which it (the Criticism, &c.) presents the architectonic plan, *i. e.* the plan regular and well disposed.

"The work entitled "The Critique of Pure Reason," is divided into several parts or sections, under the ridiculous titles of Æsthetic transcendental; of transcendental logic; of the pure ideas of the understanding; of the transcendental judgment; of the paralogism of pure reason; of the ideal transcendental; of the criticism of speculative theologies; of the discipline of pure reason, &c.

15. "But to proceed with our abstract of the system. We know objects only by the manner in which they affect us; and as the impressions which they make upon us are only certain apparitions or phenomena, it is impossible for us to know what an object is in itself. In consequence of this assertion, some have supposed that Kant is an idealist, like Berkeley and so many others, who have thought that sensations are only appearances, and that there is no truth but in our reason; but such is not the opinion of Kant. According to him, our understanding, when it considers the apparitions or phenomena, acknowledges the existence of the objects in themselves, inasmuch as they serve for the bases of those apparitions; though we know nothing of their reality, and though we can have no certitude but in experience.

"When we apply the forms of our understanding, such as unity, totality, substance, casuality, existence, to certain ideas which have no object in space and time, we make a fallacious and arbitrary application. All these forms can bear only on sensible objects, and not on the world of things in itself, of which we can think, but which we can never know. Beyond things sensible we can only have opinions or a belief of our reason.

16. "The motives to consider a proposition as true, are either objective, *i. e.* taken from an external object, so that each man shall be obliged to acknowledge them; and then there is a truth evident and susceptible of demonstration, and it may be said that we are convinced; or the motives are subjective, *i. e.* they exist only in the mind of him who judges, and he is persuaded.

"Truth, then, consists in the agreement of our notions with the objects, in such a manner as that all men are obliged to form the same judgment; belief consists in holding a thing for true in a subjective manner, in consequence of a persuasion which is entirely personal, and has not its basis in an object submitted to experience.

17. "There is a belief of doctrine, of which Kant gives, as an example, this assertion:—'there are inhabitants in the planets.' We must acknowledge, (he adds) that the ordinary mode of teaching the existence of God belongs to the belief of doctrine, and that it is the same with the immortality of the soul. The belief of doctrine (he continues) has in itself something staggering; but it is not the same with moral belief. In moral belief there is something necessary; it is (says he), that I should obey the law of morality in all its parts. The end is strongly established; and I can perceive only one condition, by means of which this end may be in accord with all the other ends, *i. e.* that there is a God. I am certain that no man knows any other condition which can conduct to the same unity of end under the moral law; which law is a law of my reason. I will consequently believe certainly the existence of God, and a future life; because this persuasion renders immoveable my moral principles—principles which I cannot reject without rendering myself contemptible in my own eyes. I wish for happiness, but I do not wish for it without morality; and as it depends on nature, I cannot wish it with this condition, except by believing that nature depends on a Being who causes this connection between morality and happiness. This supposition is founded on the want (or necessity) of my reason, and not on my duty.

18. "We have, however, no certainty (says Kant) in our knowledge of God, because certainty cannot exist except when it is founded on an object of experience. The philosopher acknowledges, that pure reason is too weak to prove the existence of a being beyond the reach of our senses. The necessity of believing in God is therefore only subjective, although necessary and general for all those beings who conform to their duty. This is not knowledge, but only a belief of reason, which supplies the place of a knowledge which is impossible.

"The proofs of natural theology (says our philosopher) taken from the order and beauty of the universe, &c. are proofs only in appearance. They resolve themselves into a bias of our reason to suppose an infinite intelligence as

the author of all that is possible; but from this bias it does not follow that there really is such an author. To say, that whatever exists must have a cause, is indeed a maxim *a priori;* but it is a maxim applicable only to experience, for one knows not how to subject to the laws of our perceptions that which is absolutely independent of them. It is as if we were to say, that whatever exists in experience must have an experience; but the world, taken as a whole, is without experience as well as its cause. It is much better to draw the proof of the existence of God from morality, than to weaken it by such reasoning. This proof is relative. It is impossible to know that God exists; but we can comprehend how it is possible to act morally on the supposition of the existence (although incomprehensible) of an intelligent Creator—an existence which practical reason forces theoretical reason to adopt. This proof not only persuades, but even acts on the conviction, in proportion as the motives of our actions are conformable to the law of morality.

"Religion ought to be the means of virtue and not its object. Man has not in himself the idea of religion as he has that of virtue. The latter has its principle in the mind; it exists in itself, and not as the means of happiness; and it may be taught without the idea of a God, for the pure law of morality is *a priori*.

19. "He who does good by inclination does not act morally. The converse of the principle of morality is to make personal happiness the basis of the will. There are compassionate minds which feel an internal pleasure in communicating joy around them, and who thus enjoy the satisfaction of others; but their actions, however just, however good, have no moral merit, and may be compared to other inclinations; to that of honour (for example), which, whilst it meets with that which is just and useful, is worthy of praise and encouragement, but not of any high degree of esteem. According to Kant, we ought not even to do good, either for the pleasure we feel in doing it, or in order to be happy, or to render others happy; for any one of these additions (perhaps motives) would be empyric, and injure the purity of our morals. A reasonable being ought to desire to be exempted from all inclinations, and never to do his duty but for his duty's sake.

"We ought to act after the maxims derived *a priori* from the faculty of knowledge, which carry with them the idea of necessity, and are independent of all experience; after the maxims which, it is to be wished, could be erected into general laws for all beings endowed with reason."

20. If this be a correct view of the object, and the results of the critical philosophy, we confess ourselves unable to discover any motive which should induce our countrymen, in their researches after truth, to prefer the dark lantern of Kant to the luminous torch of Bacon. The metaphysical reader will perceive, that, in this abstract, there is little which is new except the phraseology; and that what is new is either unintelligible or untenable.

21. The distinction between knowledge *a priori*, and knowledge *a posteriori*, is as old as speculation itself; and the mode in which Kant illustrates that distinction differs not from the illustrations of Aristotle on the same subject. The Stagyrite talked of general forms, or formal causes, in the mind, as well as the professor at Konigsberg; and he or his disciples (for we quote from memory) compared them to the form of the statue in the rough block of marble. As that form is brought into the view of the spectator by the chissel of the statuary, so, said the peripatetics, are the general forms in the mind brought into the view of consciousness by sensation and experience.

Such was the doctrine of Aristotle and his disciples, and such seems to be the doctrine of Kant and his followers; but it is either a false doctrine, or, if it be true, a doctrine foolishly expressed. A block of marble is capable of being cut into any form that the statuary pleases; into the form of a man, a horse, an ox, an ass, a fish, or a serpent. Not one of these forms, therefore, can be inherent in it, or essential to it, in opposition to the rest; and a general form, including all the animals under it, is inconceiveable and impossible. In like manner, the human mind is capable of having the ideas of a circle, a triangle, a square, of black, white, red, of sour, sweet, bitter, of the odour of a rose, and the stench of a dunghill, of proportion, of musical sounds, and of a thousand other things. None of these ideas, therefore, can be essential to the mind in opposition to the rest; and every man, who is not an absolute stranger to the operations of his own intellect, knows well that he cannot think of a thousand things at once; or, to use the language of philosophers, have in his mind a general idea, comprehending under it a thousand things so discordant as colours and sounds, figures, and smells. If, therefore, Kant means to affirm, with Plato, that, previous to all experience, there are actually in the mind general forms, or general ideas, to which sensation, or experience, gives an opportunity of coming into view, he affirms what all men of reflection know to be false. If he means only to affirm, what seems to have been the meaning of Aristotle, that particular sensations give occasion to the intellect to form general ideas, he expresses himself indeed very strangely; but his doctrine on this subject differs not essentially from that of Locke and Reid, and many other eminent metaphysicians of modern times.

22. But when Kant says that his ideas *a priori* are universal, and necessary, and that their converse is impossible, he seems by the word idea to mean what more accurate writers express by the term proposition. There are indeed two kinds of propositions, of which both may be true, though the one kind expresses necessary and universal truths, and the other such truths as are contingent and particular. Propositions directly contrary to those which express particular and contingent truths may be easily conceived; whilst such as are contrary to necessary and universal truths are inconceivable and impossible; but we doubt whether any idea, in the proper sense of the word, has a contrary, or, as he expresses it, a converse. Nothing is not contrary to substance, nor black contrary to white, nor sour contrary to sweet, nor an inch contrary to an ell. Nothing is the negation of substance, and black the negation of white; sour is different from sweet, and an inch is less than an ell; but between these different ideas we perceive no contradiction.

That Kant uses the term idea instead of proposition, or some word of similar import, is farther evident from his instances of the house on

fire, and the manner in which we learn that any two bodies added to any two other bodies will constantly make the sum of four bodies. If it be his will to use the terms *a priori* and *a posteriori* in the sense in which other metaphysicians use the terms necessary and contingent, we can make no other objection to his distinction between these two propositions, but that it is expressed in very improper language. The house might certainly be on fire or not on fire; but twice two bodies must always make the sum of four bodies, and cannot possibly make any other sum.

The truth of this last proposition (he says) we cannot have learned from experience, because experience, being always limited, cannot possibly teach us what is necessary and universal. But this is egregious trifling. The experience employed here is not limited. A child unquestionably learns the import of the terms of numeration, as he learns the import of all other terms, by experience. By putting two little balls to two little balls, he learns to call the sum four balls. After two or three lessons of this kind, with different bodies, his own reflection suggests to him, that the sum four has no dependence upon the shape or consistence of the bodies, but merely upon the individuality of each or their numerical difference; and individuality, or numerical difference, is as completely exemplified in two bodies of any kind as in two thousand.

23. All the truths of pure mathematics (says Kant) are *a priori*. If he means that they are all necessary, and that the contrary of any one of them is inconceivable, he affirms nothing but what is true, and has been known to all mathematicians these two thousand years. But, if he means that they are innate truths, not discovered by induction or ideal measurement, his meaning is demonstrably false. (See Induction.)—When he says, that it is not experience which discovers to us that we shall always have the surface of the pyramid, by multiplying its base by the third part of his height, he is right, if by experience he means the actual measurement of all possible pyramids; but surely he cannot mean that the truth of this measurement is innate in the mind, for it is in fact not a true but a false measurement. The base of a pyramid multiplied by the third part of its height, gives, not the surface, but the solid content of the pyramid; and he who understands the proposition on which this truth is immediately built, knows perfectly that Euclid proved it by a series of ideal measurements of those particulars in which all pyramids necessarily agree.

Kant seems often to confound sensation with experience; and if by experience he means sensation, when he says that pure knowledge, *a priori*, is that which is absolutely without any mixture of experience, he talks nonsense; for the most spiritual notions which men can form are derived from the operations of the mind on ideas of sensation. To the rest of the paragraph, respecting pure knowledge, we have hardly any objection to make. Locke, the great enemy of innate ideas, taught, before Kant was born, that our knowledge depends upon our organization and the faculties of our minds, as much as upon impressions made on the senses *ab extra*; that if our organs of sense were different from what they are, the taste of sugar might be bitter, and that of wormwood sweet; and that if we had not memory, and could not modify and arrange our ideas, all progress in knowledge would be impossible.

24. When our author talks of time and space, as the two essential forms of the mind, we are not sure that we understand him. A conscious intelligence may be conceived which has no ideas either of space or of time; and he who can affirm, that if extension were known to us only by experience, it would be possible to conceive sensible objects without space, has never attended to the force of what philosophers call the association of ideas in the mind. But what is here meant by sensible objects? Are they objects of touch, taste, or smell? Objects of touch cannot indeed be conceived without space; but what extent of space is suggested by the taste of sugar or the odour of a rose?

When Kant talks of the form space enabling us to attribute to external objects impenetrability, mobility, &c. he talks at random; and another man may, with as much propriety, and perhaps more truth, affirm the converse of his propositions, and say, that it is the impenetrability and mobility, &c. of external objects that enable us to form the idea called space, and the succession of some objects, compared with the permanence of others, that enables us to form the notion or mode called time.

25. On the two or three next paragraphs, it is not worth while to detain the reader with many remarks. They abound with the same uncouth and obscure phraseology, and the same idle distinctions between ideas *a priori* and *a posteriori*. In No. 11, he affirms, that the three following propositions (a body is heavy, wood is combustible, and the three angles of a triangle are equal to two right angles) are all necessary judgments. In one sense this affirmation is true, and in another it is false. We cannot, without speaking unintelligibly, give the name body to any substance which is not heavy; and we are not acquainted with any kind of wood which is not combustible; but surely it is not impossible to conceive a substance extended and divisible, and yet not heavy, to which the name body might be given without absurdity, or to conceive wood as incombustible as the mineral called asbestos. That the three angles, however, of a plane triangle can be either more or less than equal to two right angles, is obviously impossible, and must be perceived to be so by every intelligence from the Supreme down to the human. The three propositions, therefore, are not of the same kind, and should not have been classed under the same genus of necessary synthetic judgments.

In the critique of pure reason, Kant seems to teach that all demonstrative science must proceed from general principles to particular truths. Hence his forms of the understanding, and his categories, which, according to one of his pupils, (Dr. Willich,) "lie in our understanding as pure notions *a priori*, or the foundation of all our knowledge. They are necessary forms, radical notions, of which all our knowledge must be compounded." But this is directly contrary to the progress of the human mind, which, as we have shewn in the article Induction, already referred to, proceeds, in the acquisition of every kind of knowledge, from particular truths to general principles. This transcendental philosophy of Kant's, therefore, inverts the order of nature, and is as little calculated to promote the progress of science as the syllogistic system

of Aristotle, which was likewise built on categories or general forms. His transcendental æsthetic, which, according to Dr. Willich, is the knowledge *a priori* of the rules of sensation, seems to be a contradictory expression, as it implies that a man may know the laws of sensation, without paying the smallest attention to the organs of sense.

That we know objects only by the manner in which they affect us, and not as they are in themselves, is a truth admitted, we believe, by all philosophers, and certainly by Locke and Reid; but when Kant says that we know nothing of the reality of the objects which affect our senses, he seems to be singularly paradoxical. Berkeley himself, the most ingenious idealist that ever wrote, contends strenuously for the existence of a cause of our sensations distinct from our own minds; and because he thinks inert matter a cause inadequate to this effect, he concludes, that every sensation of which we are conscious is a proof of the immediate agency of the Deity. But Kant makes the existence of God and of matter equally problematical. Indeed he says expressly, that beyond things sensible we can only have opinions or belief; but things sensible, as every one knows, are nothing more than the qualities of objects.

Our philosopher's proof of a God is nothing more than his persuasion that happiness is connected with virtue by a Being upon whom nature depends; and he says expressly, that this proof carries conviction to the mind in proportion as the motives of a man's actions are conformable to the law of morality. This being the case, the reader cannot be much surprised, when he is informed that several of Kant's disciples on the continent have avowed themselves Atheists or Spinozists.

Among his categories, or fundamental ideas, which are necessarily formed in the mind, he expressly reckons cause and effect: but in various articles of this work, it has been proved beyond the possibility of contradiction, that no sensible object is the true metaphysical cause of any one event in nature; and indeed Kant himself is at much pains to shew that his categories or ideas *a priori* are not ideas of sensation. There must, therefore, upon his own principles, be causes which are not the objects of sense or experience; and by tracing these causes backward, if there be a succession of them, we must arrive at one self-existent cause, by a demonstration as complete as that by which Euclid proves the equality of the three angles of a plane triangle to two right angles. We have no other evidence for the truth of geometrical axioms than the laws of human thought, which compel us to perceive the impossibility of such propositions being false. According to our philosopher, we have the very same evidence for the reality of causes and effects which are not the objects of sense. The consequence is obvious. (*Sup. En. Brit.*)

A very luminous and masterly account of the Kantian philosophy, with a triumphant refutation of its principal sophisms, written, we believe, by Sir James Mackintosh, the learned recorder of Bombay, are given in the second number of the Edinburgh Review. We have deeply regretted that the dissertation to which we now advert, was extended to a greater length than was commensurate with our narrow limits.

KAOLIN, in the arts, the name of an earth used in the manufacture of oriental porcelain china. A specimen of this earth was brought from China, and examined by Reaumur, who found it to be infusible by fire. He thought it was a talcy earth; but Mr. Macquer says, it is more probably of an argillaceous nature, from its forming a tenacious paste, with the other ingredient called petunse, which has no tenacity. A French chemist, M. Bomaire, analized it, and found it was a compound earth consisting of clay, to which it owed its tenacity; of calcareous earth, which gave it a mealy appearance; of sparkling crystals of mica; and of small gravel, or particles of quartz-crystals. He found a similar earth upon a stratum of granite, and conjectures it may be a decomposed granite.

KAOUTCHOUC. See Caoutchouc.

KAPI, a term in the eastern countries for gate. As *alla kapi*, the gate of God.

KAPOSWAR, a fort of Lower Hungary, so called from the river Thapos, that washes its walls. Lon. 18. 13. E. Lat. 46. 31. N.

KARAITES. See Caraites.

KARAT. See Caract.

KAREK, or Garak, a small island in the Persian Gulf, where the Dutch have made a settlement: celebrated for its pearl fishery. Long. 67. 15. E. Ferro. Lat. 28. 45. N.

KARENDAR, a town of Persia, in the province of Chorasan: seventy leagues N. Herat.

KAREPOS, a town of Russia, in the government of Archangel: sixty miles N.E. Archangel.

KARGALDZIN, a lake of Russian Tartary, sixty miles in circumference; 340 miles S. Orenburg.

KARLE, a Saxon word used in our law, sometimes simply for a man; and sometimes, with an addition, for a servant or clown. Thus the Saxons call a seaman buscarle, and a domestic servant huscarle. From hence comes the modern word *churl.*

KARLSRUH, a handsome town of Germany, in the circle of Suabia, and territory of the margrave of Baden Durlach, who has here a magnificent palace. The town is built on a regular plan, and the houses are all as uniform as the streets. It is 12 miles N. by E. of Baden.

KARMATIANS, a sect of Mohammedans, who once occasioned great disorders in the empire of the Arabs.

KASAN, a large country of the Russian empire, lying on both sides of the river Volga. It was formerly an independent kingdom, subject to the Kalmuc Tartars, to whom the Great Dukes of Moscow, with the other petty principalities of Russia, were tributary. But Ivan Vassilievitch I. the founder of the Russian greatness, toward the end of the 15th century rescued his country from the Tartar yoke; and in 1552, the second duke of the same name

conquered Kasan, which now forms the three Russian governments of Kasan, Simbirsk, and Penza.

Kasan, the capital of the Russian government of the same name, seated on the rivulet Casanka, where it falls into the Volga. It is 414 miles E. by N. of Moscow. E. Lon. 49. 35. N. Lat. 55. 23.

KASSON, a populous kingdom in North Africa, of which the capital Kooniakary is placed by Major Rennel in 14. 33. N. Lat. and 8. 43. W. Lon. The king who reigned when Mr. Park was in the country was extremely kind to our traveller, though his son plundered him unmercifully, like other rapacious chiefs of that savage country. From the top of a high hill, at some distance from the capital, "I had (says Mr. Park) a most enchanting prospect of the country. The number of towns and villages, and the extensive cultivation around them, surpassed every thing I had yet seen in Africa. A gross calculation may be formed of the number of inhabitants in this delightful plain, by considering that the king of Kasson can raise 4000 fighting men by the sound of his war drum."

At Teesee, a large unwalled town, where our author resided for some days, he had an opportunity of observing the customs of the inhabitants, who consisted partly of Pagans, and partly of Bushreens, *i. e.* of negroes converted to Mahomedanism. Though these people possess both cattle and corn in abundance, rats, moles, squirrels, snakes, locusts, &c. are eaten without scruple by the highest and lowest. Another custom, still more extraordinary, is, that no woman is allowed to eat an egg. This prohibition, whether arising from ancient superstition, or from the craftiness of some old Bushreen who loved eggs himself, is rigidly adhered to; and nothing will more affront a woman of Teesee than to offer her an egg. The custom is the more singular, as the men eat eggs without scruple in the presence of their wives, and Mr. Park never observed the same prohibition in any other of the Mandingo countries.

KASTRIL, or Kestril. See Falco.

KATTEGATTE, a noted sea lying between part of Jutland and the coast of Sweden, and towards the latter covered with a great number of isles. It is almost closed at the extremity by the low Danish islands of Sealand and Funen, which had in old times been (with Sweden) the seat of the Suiones. Between the first and the coast of Sweden is the famous sound, the passage tributary to the Danes by thousands of ships. These islands were of old called *Codonania*, and gave to the Kattegatte the name of *Sinus Codanus*. Its greatest depth is 35 fathoms. It decreases as it approaches the sound; which begins with 16 fathoms, and near Copenhagen shallows even to four. The Roman fleet, under the command of Germanicus, sailed, according to Pliny, round Germany, and even doubled the *Cimbricum Promontorium*, and arrived at the islands which fill the bottom of the Kattegatte; either by observation or information, the Romans were acquainted with 23. One they called *Glessaria*, from its amber, a fossil abundant to this day on part of the south side of the Baltic. A Roman knight was employed by Nero's master of the gladiators to collect in these parts that precious production, by which he became perfectly acquainted with this country.

KATUKA Retula Poda. In amphibiology, a species of Indian viper (coluber), systematically denominated Coluber Russellii, as being, in the first instance, minutely described by Dr. Russell. The plates of its belly are a hundred and sixty-one: the candal scales a hundred and ten. A brownish-yellow snake, with acutely-ovate, blackish, dorsal spots, edged with white, and smaller ovate lateral ones: length about four feet: the under part of the body is white, with a few dusky spots; the head is rather large, snout obtuse, mouth wide, fangs large, and poisonous; and, as in other poisonous serpents, double; a smaller fang being situated close to the larger, on each side.

This species is as common in India as the Coluber Naja, or Cobra de Capello; but from its not being publicly exhibited, less generally known. Its bite proves fatal to chickens in thirty-eight seconds; and to a dog in twenty-six minutes. A rabbit exposed to the same animal, after he had bitten a chicken and two dogs, died in less than an hour.

The poison of the Katuka, like that of the Cobra de Capello, has little or no taste when diluted; is neither acid nor alkaline; and in many other qualities bears a resemblance to the Cobra de Capello, and especially that variety of it called the *Coodum Nagoo*. See Coluber.

KATZENAUGE. In mineralogy cat's-eye. *Oeil de Chat:* a species of Felspar, for which see Feldspatum. It consists of about ninety-five in a hundred parts of silex, the rest being alumine, and lime, with a very small proportion (usually 0. 25.) of oxyd of iron. Of its geognostical situation we have no certain knowledge. It is brought to Europe from Ceylon, and the Malabar coast, sometimes from Siberia. It is set in rings, and is in considerable estimation.

KAUFFBEUREN, a free and imperial town of Germany, in the circle of Suabia and territory of Kempten. The inhabitants consist of papists and protestants. It is seated on the river Wardach, 18 miles N. E. of Kempten, and 30 S. by W. of Augsburg. E. Lon. 10. 43. N. Lat. 47. 58.

KAUFFMAN (Angelica), a celebrated painter; was born at Coire, the capital of the Grisons, October 30, 1740. She was the only daughter of John Joseph Kauffman, of Swarthemberg, and of Cleophe Lucin, of

the same place. Her father was a painter of some consideration, and her mother a woman highly respectable for her domestic virtues.

In her very infancy Angelica evinced a strong disposition for the arts of design; for nothing gave her so much delight as examining and copying prints. Her inclination did not escape the observation of her father: her infant genius was accordingly fostered by him, with instruction in some principles of the art; and so rapid was her proficiency, that, when only between eight and nine years of age, she already began to paint, first in crayons and then in oil. In these pursuits she laboured under an insurmountable difficulty, as, by the decorums of her sex, she was prevented from resorting to academies, and from thus forming her judgment and taste by naked living figures. But this circumstance by no means discouraged her. By drawing after the most correct models, and by the assiduous study of the works of the best artists, she compensated the unavoidable deficiency of academic instruction. And this, perhaps, ultimately proved an advantage to her; since, free from the danger of taking a bias to any peculiar method, she became more adapted to form an exclusive and original character in painting.

When it had been determined that she should pursue painting as a profession, she was sent to Italy, to study the works of the ancient masters. She first visited Florence, to examine the collection of that once splendid gallery; thence she proceeded to Rome. What length of time she remained at those places we are unable to state; but probably her stay was not long, as she came over to England in the year 1765. Shortly after her arrival in this country, she was elected a member of the Royal Academy, an honour to which few of her sex have attained, and which affords a striking proof of her proficiency in the art.

She resided in England sixteen years, and it was during this interval that she painted those subjects by which she is best known to the British public, and on which her reputation is, perhaps, principally founded. Many of the subjects which have called forth the talents of our finest engravers were furnished by her, and to her pencil also several of our most splendid publications owe some of their most pleasing embellishments.

In the year 1781, she quitted England, and remained for a short time in Germany: she thence passed into Italy, and finally settled at Rome, where the last years of her life were passed in the exercise of her profession, and in the enjoyment of that universal admiration which her talents had inspired.

Her celebrity, however, could not, it seems, altogether exempt her from the evils resulting from the revolutionary disorders of Europe. During the predatory incursions of the French into Italy, in the year 1798, in which private and public property became their indiscriminate plunder, she was obliged to compound with those worse than vandal invaders, for the paintings in her possession which were done for some English friends, by paying for their preservation a sum of about 40l.

Although it is unnecessary to enter here into a detailed account of all her pictures, yet we cannot satisfy ourselves without specifying a few. On her return to Rome, in 1784, she executed two pictures, which had been requested of her by the emperor Joseph. For the subject of one of those performances, she selected Eneas doing the honours of the funeral of young Pallas, after the battle against the Tyrrhenians; and for that of the other, Arminius when, having defeated the Romans, with the death of Quintilius Varus, returning to his forest loaded with Roman trophies, he is met by his wife and other young women, spreading flowers in his path, and presenting him with laurel crowns. The two pictures, by the means of cardinal Herzan, imperial plenipotentiary in Rome, were sent to the emperor, who, in return, wrote with his own hand to the cardinal a letter, expressing the highest degree of satisfaction and acknowledgment. "As a token," said he, "of my gratitude, I join to this letter a snuff-box and a medal, which your eminence will have the goodness to present in my name to Angelica. I desire you likewise to inform her, that the two works are already placed in the imperial gallery; for, I wish that, as well as myself, all my subjects may admire her superior talents."

These two great historical paintings occupied Angelica during the whole year 1785, and more than one half of the next, but not exclusively; for, in that interval, she executed the commission of the late empress Catherine of Russia, for a large picture representing Servius Tullius, the sixth king of the Romans, when, in his childhood, falling asleep in the apartments of the elder Tarquin, a bright flame was seen on his head, and queen Tanaquil and her maids of honour wishing to extinguish it, were prevented by Tarquin, who regarded that phenomenon as a harmless presage of his future greatness. In that interval, also, and in the course of 1787, she finished a picture for king Stanislaus of Poland, the subject of which was, Virgil reading to Augustus and Octavia the sixth book of the Eneid, and the empress fainting at the recital of the passage in which the name of young Marcellus is introduced.

We shall take no notice of some other equal or inferior works which this artist executed from 1788 to 1790, for they do not materially add to her merit and fame. We shall, however, mention, as the last of her great historical paintings, that which,

towards the close of 1790, in consequence of a commission from Pius VI. she made for the celebrated sanctuary of our Lady at Loretto. The subject was the blessed Virgin, in her childhood, pouring from a little vessel some water on a young lily, and, her face turned towards heaven, contemplating a ray of light descending on her head; whilst her parents, Joachim and Anne, surprised at the phenomenon, seem to offer their pious thanks to God. Pius VI. was so satisfied with this performance, that, in 1792, he issued orders that it should be executed, as it usually was, in mosaic, for the church of Loretto.

We cannot close the account of this extraordinary women, without giving some hints concerning the rank which she occupies among painters—at least among those of her own sex. In the golden age of arts in Italy, and in the subsequent century also, seven female painters flourished. Lavinia Fontana, Artemisia Gentileschi, Chiara Varotari, Giovanna Carzoni, Maria Tintoretto (the daughter of the great painter of this name) Sophonisba Anguisciola, and Elizabeth Sirani. None of these ever rose to the highest degree of merit; none, at least, were able to enter into competition with their contemporary great painters of the other sex; none of them, consequently, can rival the merit of Angelica Kauffman! In the last century, Rosalba Carriera (better known only by her christian name, Rosalba) was justly considered as a female painter until then unknown in the history of the art, and capable of coming into competition with any painter of the other sex. In the line of crayons and of miniature she had only a few rivals: in the clearness and liveliness of her colours she was admirable. As far, therefore, as a generic comparison can be made, this is the only female painter who can balance the merit and fame of the subject of our memoir. We shall decline any decision on this head: but supposing the question should be never decided, Angelica may be satisfied with her share of glory, if one person only of her sex be brought into competition with her, in the whole history of the art of painting among the moderns.

Maria Angelica Kauffman died at Rome on the 5th of November, 1807, aged 67 years and six days. She was of a middle size, and well proportioned, with a round face, bright eyes, and expressive countenance. In her youth she had been uncommonly handsome, and even in her advanced age she preserved a cheerful and prepossessing look. She was of an excellent moral character; was always sober and retired, and, in her leisure hours, only indulged in the society of her relations and friends. She had no issue by her husband, Mr. Zucchi; and leaving behind her a considerable fortune, she disposed of a part of it in favour of a pious foundation in Coire, and of another part in favour of her collateral relations. During the three weeks of the illness which preceded her decease, she received the sacraments, according to the ritual of the Roman catholic church. After death, such honours were paid to her remains as to add, if possible, to her fame, and to reflect great credit on the inhabitants of Rome. She was buried with solemn pomp in her parish church of St. Andrew delle Fratte. The funeral ceremony was chiefly directed by the excellent sculptor the Chevalier Canova, and was attended by all the academicians of St. Luke, and all the literary corporations.

To KAW. *v. n.* (from the sound.) To cry as a raven, crow, or rook (*Locke*).

KAW. *s.* (from the verb.) The cry of a raven or crow (*Dryden*).

KAY, Quay, or Key. See Key.

Kay (William), a portrait and historical painter, born at Breda, in 1520 and died in 1568. His death was occasioned by grief, caused by the duke of Alva's sentencing count Egmont and Hoorn to death at the very time when he was sitting to him for his picture.

KAYE'S Island, an island in the North Pacific Ocean, near the west coast of North America, about thirty miles in length, and four in breadth, discovered and named by captain Cook, the south-west point situated in Long. 216. 58. E. Greenwich. Lat. 59. 49. N.

KAYLE. *s.* (*quille*, French.) 1. Ninepin; kettlepins, of which skittles seems a corruption (*Carew*).

KEYSERBERG, or Kaiserberg, a town of France, in the department of the Upper Rhine, and chief place of a canton, in the district of Colmar: one league and three quarters NW. Colmar, and five SE. St. Diey.

KAYSERHEIM, a princely abbey of Germany, in the circle of Swabia, near Donauwert, separated from Bavaria, and joined to the circle of Swabia in the year 1757, founded in the year 1126. It pays as an annual contribution, 300 florins, and is taxed to the imperial chamber 338 rixdollars, twenty-three kruitzers.

KAZAN, a city of Russia, and capital of a government to which it gives name, situated on the Volga. In the Turkish and Tartarian languages, Kazan signifies a cauldron large enough to contain victuals for many persons; and this name the Crim and Budziak Murses give to the families of their subjects or vassals, about ten men being reckoned to a Kazan. This city consists of a strong fort, built with stone, the Wooden Tower, as it is called, and several adjoining slobodes, or suburbs; and among these there is one inhabited by Tartars, in which are four metsheds. Here are several churches, almost all of them built with stone, and eleven convents in and near the town. In the fort is the government's chancery, which

is under the direction of the governor and deputy-governor. The governor of the fort has all the garrisons and regiments within the government under his command. The garrison of the city consists of three regiments, for the service of which a very good hospital is provided. Kazan is also an archbishop's see. At one end of the town is a cloth manufacture, and all the cloth is bought up at a set price by the crown, in order to clothe the soldiers. In the convent of Silandowo, which stands on the river Kazanka, about two wersts from the town, is a school, where the children of Tartars are taught the Russian and Latin languages, the principles of the Christian religion, and the elements of philosophy, in order to qualify them as preachers for the conversion of the nations to which they belong. In 1749, and 1752, this city was totally destroyed by fire. The Russians first made themselves masters of this important place on the third of October, 1552: 400 miles E. Moscow, and 660 S.E. Petersburg. Long. 66. 49. E. Ferro. Lat. 55. 45. N.

KEALE, small fragments resembling chips or broken pieces of stone of various kinds; some of lime-stone, others of free-stone, and others of rag-stone, found mixed among the earth, of the upper stratum in many parts of this kingdom, and giving that soil the name of *kealy;* hence, some of these pieces of *keale* are thin and flat like bits of slate.

KEBLA, or KEBLAH, called also KEBLEH, KIBLEH, and ALKEBLA, among the MUSSULMEN, denotes that point, or quarter, to which they turn themselves when they say their prayers.

Mahomet, at first, durst not propose any other kebla to his followers than the temple of Jerusalem, which was the kebla of the Jews and Christians. In the course of time, however, being willing to bring them off from any communication, in matters of religion, with the Jews and Christians, he appointed them, in the Koran, to turn themselves, at prayer, towards the temple of Mecca: from which time they called those two temples the keblatan, or two keblas.

Ricaut adds, that it is not the temple of Mecca, properly speaking, that the Turks call kebla, but rather the large square tower in the middle of the amphitheatre of that temple.

The kebla of the Jews was the temple at Jerusalem; that of the Sabians, the meridian; and that of the Magians the rising sun. To this the prophet Ezekiel refers chap. viii. 16.

KEBLA is also used for an altar, or rather a niche, as Ricaut calls it, which the Mahometans have in all their mosques, and which is placed very exactly on that side towards the temple of Mecca.

To KECK. *v. a.* (*kecken*, Dutch.) To heave the stomach; to reach at vomiting (*Bacon*).

To KE'CKLE. *v. a.* To defend a cable round with rope (*Ainsworth*).

KE'CKSY. *s.* (commonly *kex*, *cigue*, Fr. *cicuta*, Lat.) Hemlock (*Shakspeare*).

KE'CKY. *a.* (from *kex.*) Resembling a kex (*Grew*).

KEDAR, in ancient geography, a district in the desert of the Saracens, on the north of Arabia Felix.

KEDES, in ancient geography, a city of refuge in the tribe of Naphthali, on the confines of Tyre and Galilee.

To KEDGE. *v. a.* (*kaghe*, a small vessel, Dutch.) To bring a ship up or down a narrow river against the wind (*Harris*).

KE'DGER. *s.* (from *kedge.*) A small anchor used in a river.

KEDGING, in the sea-language, is when a ship is brought up or down a narrow river by means of the tide, the wind being contrary. To do this, they use to set their four-course, or fore-top-sail and mizen, that so they may flat her about; and if she happen to come too near the shore, they let fall a kedge-anchor, with a hawser fastened to it from the ship, in order to turn her head about; which work is called kedging.

KEDRON, or CEDRON, in ancient geography, a town which, from the defeat and pursuit of the Syrians (1 Mac. xvi.), appears to have stood on the road which led from the Higher India to Azotus: in that war it was burnt by the Jews.

KEDRON, or CEDRON, in ancient geography. St. John calls it a brook, but Josephus a deep valley between Jerusalem and Mount Olivet to the east; called also Kedron from its blackness. Maundrel says that in his time it was a brook only in winter, or in rainy weather.

KE'DLACK. *s.* A weed that grows among corn; charlock (*Tusser*).

KEE. The provincial plural of *cow*, properly *kine*.

KEEL, the lowest piece of timber in a ship, running her whole length from the lower part of her stern to the lower part of her stern-post. Into it are all the lower futtocks fastened; and under part of it a false keel is often used.

By comparing the carcass of a ship to the skeleton of a human body, the keel appears as the back bone, and the timbers as the ribs. Accordingly, the keel supports and unites the whole fabric, since the stem and stern-posts, which are elevated on its ends, are, in some measure, a continuation of the keel, and serve to connect and enclose the extremities of the sides by transoms, as the keel forms and unites the bottom by timbers.

The keel is generally composed of several thick pieces placed lengthways, which, after being scarfed together, are bolted and clinched upon the upper side.

KEEL. Carina. In botany, the lower petal of a papilionaceous corol, enclosing

the stamens and pistil: usually shaped like a boat.

KEELED. Carinatus. Having a longitudinal prominency upon the back. Applied to the leaf, calyx and nectary.

To KEEL. *v. a.* (cœlan, Saxon.) To scum.

KE'ELFAT. *s.* (cœlan, Saxon.) to cool, and *fat* or *vat*, a vessel.) Cooler; tub in which liquor is let to cool.

KEEL hauling, a punishment inflicted for various offences in the Dutch navy. It is performed by suspending the culprit by a rope from one yard-arm, with a weight of lead or iron upon his legs, and having another rope fastened to him, leading under the ship's bottom, and through a block at its opposite yard-arm; he is then repeatedly and suddenly let fall from the one yard-arm into the sea, where, passing under the ship's bottom, he is hoisted upon the opposite side of the vessel to the other.

KEELERS, among seamen, are small tubs, which hold stuff for the caulking of ships.

KEELSON, a principal timber in a ship, fayed within-side cross all the floor-timbers; and being adjusted to the keel with suitable scarfs, it serves to strengthen the bottom of the ship.

KEEN. *a.* (cene, Saxon.) 1. Sharp; well edged; not blunt (*Dryden*). 2. Severe; piercing (*Ellis*). 3. Eager; vehement (*Tatler*). 4. Acrimonious; bitter of mind (*Swift*).

To KEEN. *v. a.* To sharpen (*Thomson*).

KEENERS. The name of the Irish Singing mourners. The Irish have always been remarkable for their funeral lamentations, and once were celebrated for their musical art in their last sad offices to their departed friends. Formerly these duties were performed by dressing the body of the deceased in grave clothes, ornamenting it with flowers, and placing it on a bier; when the relations and keeners ranging themselves in two divisions, one at the head, and the other at the feet of the corpse, the chief bard of the head chorus, softly accompanied by the harp, sung the first stanza of the Caoinan, or funeral song; this being ended, the foot semichorus began the lamentation, or Ullaloo, in which they were answered by the head semichorus, and then both united in one general chorus. After this, the chief bard of the foot semichorus began the second Gol, or lamentation, in which he was answered by that of the head; and then, as before, both united in the general full chorus. Thus, alternately, were the song and chorusses solemnly performed during the night. But whatever merit or decorum there might formerly be in these vocal obsequies of the Irish, they have at present little to boast either of melody, harmony, or dignity. The keeners now generally consist of a motley multitude of men, women, and children, and the Caoinan is degenerated into a wild and hideous howl (*Busby*).

KE'ENLY. *ad.* (from *keen.*) Sharply; vehemently; eagerly; bitterly.

KE'ENNESS. *s.* (from *keen.*) 1. Sharpness; edge (*Shakspeare*). 2. Rigour of weather; piercing cold. 3. Asperity; bitterness of mind (*Clarendon*). 4. Eagerness; vehemence.

To KEEP. *v. a.* (cépan, Saxon, *kepen*, old Dutch.) 1. To retain; not to lose (*Temple*). 2. To have in custody (*Knolles*). 3. To preserve; not to let go (*Chronicles*). 4. To preserve in a state of security (*Addison*). 5. To protect; to guard (*Genesis*). 6. To restrain from flight (*Acts*). 7. To detain, or hold as a motive (*Dryden*). 8. To hold for another (*Milton*). 9. To tend; to have care of (*Carew*). 10. To preserve in the same tenour or state (*Addison*). 11. To regard; to attend (*Dryden*). 12. To not suffer to fall (*Psalms*). 13. To hold in any state (*Locke*). 14. To retain by some degree of force in any place or state (*Sidney*). 15. To continue any state or action (*Knolles*). 16. To preserve in any state (*Ecclus*). 17. To practise; to use habitually (*Pope*). 18. To copy carefully (*Dryden*). 19. To observe or solemnize any time (*Milton*). 20. To observe; not to violate (*Shakspeare*). 21. To maintain; to support with necessaries of life (*Milton*). 22. To have in the house (*Shakspeare*). 23. Not to intermit (*Ecclus*). 24. To maintain; to hold (*Hayward*). 25. To remain in; not to leave a place (*Shakspeare*). 26. Not to reveal; not to betray (*Tillotson*). 27. To restrain; to withhold (*Boyle*). 28. To debar from any place (*Milton*). 29. *To* KEEP *back*. To reserve; to withhold (*Jeremiah*). 30. *To* KEEP *back*. To withhold; to restrain (*Psal.*) 31. *To* KEEP *company*. To frequent any one; to accompany (*Donne*). 32. *To* KEEP *company with*. To have familiar intercourse (*Broome*). 33. *To* KEEP *in*. To conceal, not to tell (*Addison*). 34. *To* KEEP *in*. To restrain; to curb (*Locke*). 35. *To* KEEP *off*. To bear at distance. 36. *To* KEEP *off*. To hinder (*Locke*). 37. *To* KEEP *up*. To maintain without abatement (*Addison*). 38. *To* KEEP *up*. To continue; to hinder from ceasing (*Taylor*). 39. *To* KEEP *under*. To oppress; to subdue (*Atterbury*).

To KEEP. *v. n.* 1. To remain by some labour or effort in a certain state (*Pope*). 2. To continue in any place or state; to stay (*Sidney*). 3. To remain unhurt; to last (*Sidney*). 4. To dwell; to live constantly (*Shakspeare*). 5. To adhere strictly (*Addison*). 6. *To* KEEP *on*. To go forward (*Dry.*) 7. *To* KEEP *up*. To continue unsubdued.

KEEP. *s.* (from the verb.) 1. Custody; guard (*Dryden*). 2. Guardianship; restraint (*Ascham*).

KEEP, in ancient military history, a kind of strong tower, which was built in the centre of a castle or fort, to which the besieged retreated, and made their last efforts of defence.

Of this description is the keep of Windsor Castle.

KE'EPER. *s.* (from *keep.*) 1. One who holds any thing for the use of another (*Sidney*). 2. One who has prisoners in custody (*Dryden*). 3. One who has the care of parks, or beasts of chase (*Shakspeare*). 4. One that has the superintendance or care of any thing (*Kings*).

KEEPER OF THE GREAT SEAL, is a lord by his office, and styled lord keeper of the great seal of Great Britain; he is always one of the privy counsel. All grants, charters, and commissions of the king under the great seal pass through the hands of the lord-keeper; for without that seal many of those grants, &c. would be of no force. The king being, in the interpretation of the law, a corporation, he therefore passes nothing but by the great seal, which is also said to be the public faith of the kingdom, being in the highest esteem and reputation. Whenever there is a lord-keeper, he is invested with the same place, authority, preeminence, jurisdiction, or execution of laws, as the lord chancellor of Great Britain is vested with. The lord-keeper is constituted by the delivery of the great seal, &c.

KEEPER *of the Privy seal*, is also a lord by his office, through whose hands all grants, pardons, &c. pass before they come to the great seal; and even some things pass his hands which do not pass the great seal at all. The officer is also one of the privy-council, yet was anciently called clerk of the privy seal. His duty is to put the seal to no grant, &c. without a proper warrant; nor with warrant where it is against law, or inconvenient, but shall first acquaint the king therewith.

KEEPERS, in sporting are officers of various descriptions, neither servants of the crown nor of individuals : whence we have forest-keepers, park-keepers, and game-keepers. It is the province of the first to protect and superintend the deer in any one of his majesty's forests, to which he is appointed, and to enforce the laws enacted for their preservation, against depredators of every description. Park-keepers are retained in the service of noblemen and gentlemen who have parks stocked with deer, having the same perquisites and privileges as those employed in the service of the crown; their employment is principally to superintend, preserve, and regulate the stock, as well as to kill Bucks, Does, and Fawns, according to the season, when required for the table; which can never be done by any park-keeper of the crown, without the receipt of a proper warrant previously issued from superior authority for that purpose. Game-keepers are employed in various forests, parks, chases, free-warrens, and manors, the property of the crown, to furnish a constant supply of Game for his majesty's table and household, so as to prevent too great an influx at one time, and too short a supply at another. Every lord or lady possessing a manor within any part of the kingdom, has also the power of appointing a person, under the denomination of a game-keeper, to protect, preserve, or kill any kind of game upon the particular manor for which he is appointed; and to execute and enforce all such other manorial rights and privileges within the department, as may appertain to his delegation; he first conforming to the legal prescription, before he can be confirmed, or qualified to act in the office to which he has been deputed.

KEEPERSHIP. *s.* (from *keeper.*) Office of a keeper.

KEEPING, in painting denotes the representation of objects in the same manner that they appear to the eye at different distances from it; for which the painter should have recourse to the rules of perspective. There are two instances in which the famous Raphael Urbin has transgressed these rules: in one of his cartoons, representing the miraculous draught of fishes, the men in each of the two boats appear of full size, the features of their faces being strongly marked; and the boats are represented so small, and the men so big, that any one of them appears sufficient to sink either of the boats by his own bare weight: and the fowls on the shore are also drawn so big, as to seem very near the eye of the observer, who could not possibly, in that case, distinguish the features of the men in the distant boats. Or, supposing the observer to be in either of the boats, he could not see the eyes or beaks of the fowls on the shore. The other instance occurs in his historical picture of our Saviour's transfiguration on the mount. See CARTOONS.

KEFFEHIL, in Mineralogy. See MEERSCHARM.

KEG, a small barrel, commonly used to contain small fish, as herrings, anchovies, &c.

KEHL, or KEIL, once an important fortress of Germany, in the circle of Suabia. It is seated on the Rhine, opposite Strasburg, to which when the latter was an imperial city it belonged. It was also strongly fortified by the French, who took possession of it in 1684. Being ceded to the empire at the peace of Ryswick, the emperor consigned it to the house of Baden, reserving to himself, however, the right of a garrison. During the time of the French revolution this fortress changed masters several times; but after 1801, it was demolished in compliance with the terms of the treaty of peace. Lon. 7. 45. E. Lat. 48. 40. N.

KEILL, (Dr. John), a celebrated astronomer and mathematician, was born at Edinburgh in 1671, and studied in the university of that city. In 1694 he went to Oxford, where, being admitted of Baliol college, he began to read lectures according to the Newtonian system in his private chamber in that college. He is said to have been the first who taught

Sir Isaac Newton's principles by the experiments on which they are founded: and this, it seems he did by an apparatus of instruments of his own providing; by which means he acquired a great reputation in the university. The first specimen he gave the public of his skill in mathematical and philosophical knowledge, was his Examination of Dr. Burnet's Theory of the Earth, with Remarks on Mr. Whiston's theory: and these theories being defended by their respective inventors, drew from Mr. Keill An Examination of the Reflections on the Theory of the Earth, together with A Defence of the Remarks on Mr. Whiston's New Theory. In 1701 he published his celebrated treatise entitled Introductio ad veram physicam, which only contained 14 lectures; but in the following editions he added two more. This work has been translated into English, under the title of An Introduction to Natural Philosophy. Afterwards being made fellow of the Royal Society, he published, in the Philosophical Transactions, a paper on the laws of attraction; and being offended at a passage in the Acta Eruditorum of Leipsic, warmly vindicated against Mr. Leibnitz, Sir Isaac Newton's right to the honour of the first invention of his method of fluxions. In 1709 he went to New England as treasurer of the Palatines; and soon after his return in 1710, he was chosen Savilian professor of astronomy at Oxford. In 1711, being attacked by Leibnitz, he entered the lists with that mathematician, in the dispute concerning the invention of fluxions. Leibnitz wrote a letter to Dr. Hans Sloane, then secretary to the Royal Society, requiring Keill, in effect, to make him satisfaction for the injury he had done him in his paper relating to the passage in the Acta Eruditorum: he protested, that he was far from assuming to himself Newton's method of Fluxions; and therefore desired that Keill might be obliged to retract his false assertion. On the other hand, Keill desired that he might be permitted to justify what he had asserted. He made his defence to the approbation of Newton, and other members of the Society. A copy of this was sent to Leibnitz; who, in a second letter, remonstrated still more loudly against Keill's want of candour and sincerity; adding, that it was not fit for one of his age and experience to engage in a dispute with an upstart, who acted without any authority from Newton, and desiring that the Royal Society would enjoin him silence. Upon this, a special committee was appointed; who, after examinining the facts, concluded their report with "Reckoning Mr. Newton the inventor of Fluxions; and that Mr. Keill, in asserting the same, had been no ways injurious to Mr. Leibnitz." The whole preceedings may be seen in Collins's Commercium Epistolicum, with many valuable papers of Newton, Leibnitz, Gregory, and other mathematicians. In the mean time Keill behaved himself with great firmness and spirit; which he also shewed afterwards in a Latin epistle, written in 1720, to Bernoulli, mathematical professor at Basil, on account of the same usuage shewn to Newton: in the title page of which he put the arms of Scotland, viz, a Thistle, with this motto, "Nemo me impune lacessit."

About the year 1711, several objections being urged against Newton's philosophy, in support of Des Cartes's notion of a plenum, Keill published a paper in the Philos. Trans. on the Rarity of Matter, and the Tenuity of its Composition. But while he was engaged in this dispute, queen Anne was pleased to appoint him her Decipherer; and he continued in that place under king George the First till the year 1716. The university of Oxford conferred on him the degree of M. D. in 1713; and, two years after, he published an edition of Commandine's Euclid, with additions of his own. In 1718 he published his Introductio ad Veram Astronomiam: which was afterwards, at the request of the duchess of Chandos, translated by himself into English; and, with several emendations, published in 1721, under the title of An Introduction to True Astronomy, &c. This was his last gift to the public; being this summer seized with a violent fever, which terminated his life Sept. 1, in the 50th year of his age.

His papers in the Philos. Trans. above alluded to, are contained in volumes 26 and 29.

Keill (Dr. *James*), an eminent physician and philosopher, and younger brother of Dr. John Keill above mentioned, was also born in Scotland, in 1673. Having travelled abroad, on his return he read lectures on Anatomy with great applause in the universities of Oxford and Cambridge, by the latter of which he had the degree of M. D. conferred upon him. In 1703 he settled at Northampton as a physician, where he died of a cancer in the mouth in 1719. His publications are

1. An English translation of Lemery's Chemistry. 2. On Animal Secretion, the quantity of blood in the human body, and on Muscular Motion. 3. A treatise on Anatomy. 4. Several pieces in the Philos. Trans. volumes 25 and 30.

KEISERSBERG, a town of Alsace in France, and in the bailiwic of Haguenau, which has belonged to the French ever since the year 1548. It is seated in a pleasant country, in E. lon. 7. 25. N. lat. 49. 10.

KEISERSLAUTERN, a town of Germany, in the Lower Palatinate, belonging to the elector Palatine; seated on the river Lauter, in E. lon. 7. 51. N. lat. 49. 20.

KEISERSTOUL, a town of Switzerland in the county of Baden, with a bridge over the Rhine, and a castle. It belongs to the bishop of Constance, and is situated in E. lon. 8. 40. N. lat. 47. 10.

KELL. *s.* A sort of pottage; a soup made with shreaded greens (*Ainsworth*).

KELL. s. The omentum; that which inwraps the guts (*Wiseman*).

KELLINGTON, or CALLINGTON, a borough in Cornwall, with a good market on Wednesday. It is 12 miles S. of Launceston, and 217 W. by S. of London. W. lon. 4. 35. N. lat. 50. 30.

KELLS, a fair and post-town of Ireland, iu the county of Meath and province of Leinster, 31 miles from Dublin. It is a borough likewise, and returns two members to parliament; patron earl of Bective. This place gives title of viscount to the family of Cholmondely. Near it is Headfort, the magnificent seat of Lord Bective. This town is pleasantly situated on the river Blackwater, and has four fairs. It was anciently called Kenanus, and afterwards Kenlis. In former ages it was one of the most famous cities in the kingdom; and on the arrival of the English was walled and fortified with towers. In 1178 a castle was erected where the market-place now is; and opposite to the castle was a cross of an entire stone, ornamented with bas-relief figures and many curious inscriptions in the ancient Irish character. Within a small distance was the church of St. Senan; and on the south of the church-yard is a round tower, which measures 99 feet from the ground, the roof ending in a point; and near the top were four windows opposite to the cardinal points. There was a celebrated monastery founded here in 550 for regular canons, and dedicated to the Virgin Mary. It owed its origin to St. Columb, to whom the site of the abbey was granted by Dermond Mac Carval, or Dermond the son of Kervail, king of Ireland. An Episcopal see was afterwards erected here, which in the 13th century was united to that of Meath. A priory or hospital was also erected by Walter de Lacie, lord of Meath, in the reign of Richard I. for cross-bearers or crouched friars following the order of St. Augustin. There was likewise a pepetual chantry of three priests or chaplains in the parish church of St. Columb in Kells to celebrate mass daily; one in the Rood chapel, another in St. Mary's chapel, and a third in the chapel of St. Catharine the virgin.

KELLY (Hugh), an Irish writer, was born in 1739, and bred to the business of a staymaker, which profession he quitted in London, and became writer to an attorney. Afterwards he turned author with considerable success, and died in 1777. His works are, 1. False Delicacy. 2. A Word to the Wise. 3. The School for Wives. 4. The Romance of an Hour; Comedies. 5. Clementina, a tragedy. 6. Thespis, a poem in the manner of Churchill's Rosciad. 7. Memoirs of a Magdalen, a novel. 8. The Babler, a collection of essays.

KELP. See SALICORNIA.

KELP. In chemistry Carbonat of Soda: a salt found to exist both in the mineral and vegetable kingdoms of nature. When mineral it is met with either dissolved in the water of certain hot springs, as those of Carlsbad in Bohemia and Rykum in Iceland, or of certain lakes, as the natron lakes of Egypt and Hungary: or it occurs in the state of a solid salt as the fossile natron of Tripoli called Irona. In the vegetable kingdom it has been proved to exist ready formed in the salsola soda, and in all probability is contained in all those succulent saline plants that grow in places impregnated with muriat of soda. See CARBONAT and SODA.

KELP *Salicornia* is thrown on the rocks and shores in great abundance, and in the summer months is raked together and dried as hay in the sun and wind, and afterwards burned to the ashes called *kelp*, for the glass makers. The process of making it is thus: the rocks, which are dry at low water, are the beds of great quantities of sea-weed; which is cut, carried to the beach, and dried: a hollow is dug in the ground three or four feet wide; round its margin are laid a row of stones, on which the sea-weed is placed, and set on fire within; and quantities of this fuel being continually heaped upon the circle, there is in the centre a perpetual flame, from which a liquid like melted metal drops into the hollow beneath: when it is full, as it commonly is ere the close of day, all heterogeneous matter being removed, the kelp is wrought with iron rakes, and brought to an uniform consistence in a state of fusion. When cool, it consolidates into a heavy dark-coloured alkaline substance, which undergoes in the glass-house a second vitrification, and assumes a perfect transparency. The progress by which thus a parcel sea-weed, formerly the slimy bed of seals or dreary shelter of shell-fish, is converted into a crystal lustre for an assembly-room, or a set of glasses for his majesty's table, is a metamorphosis that might be a subject for an entertaining tale.

KELSO, a town of Scotland, in the county of Roxburg, situated on the river Tweed, at its conflux with the Tiviot, with a bridge across the Tweed, built in the year 1756, and another, either built or intended to be built, over the Tiviot. It is governed by a baron-baily, and fifteen stent-masters; the former, and seven of the latter, appointed by the duke of Roxburg, who is lord of the manor. The office of the stent-masters is under the authority of the baron-bailie, to levy a stent, or rate, on the inhabitants, for the supply of water, repairing the streets, &c. It contains 376 houses, and about 3550 souls. There are some manufactures of flannels, linen, stockings, and shoes. During the wars between the English and the Scotch, Kelso was burned down three times by the former. In the latter end of the 17th century it was destroyed by an accidental fire, and in the middle of the last by another. At present it is a handsome town, with a large market-place, and four principal streets,

with two small ones. Here are the remains of a celebrated abbey, founded by St. David, king of Scotland, in the 12th century: forty-two English miles SSE, Edinburgh, and 338 N. London. Lon. 1. 20. W. Lat. 55. 38. N.

KELSON. See KEELSON.

To KEMB, *v. a.* [cœmban, Saxon.] To separate or disentangle by a denticulated instrument; to comb (*Ben Johnson*).

KEMPEN, a town of Germany, in the electorate of Cologne; seated on the river Niers, 30 miles N. W. of Cologne. E. lon. 6. 30. N. lat. 51. 18.

KEMPIS (Thomas A), a pious and learned regular canon, was born at the village of Kemp, in the diocese of Cologne, in 1380; and took his name from that village. He performed his studies at Deventer, in the community of poor scholars established by Gerard Groot; and there made a great progress in the sciences. In 1399 he entered the monastery of the regular canons of Mount St. Agnes, near Zwol, of which his brother was prior. Thomas à Kempis there distinguished himself by his eminent piety, his respect for his superiors, his charity to his brother canons, and his continual application to labour and prayer. He died in 1471, aged 70. The best editions of his works, which consist of sermons, spiritual treatises, and lives of holy men, are those of Paris in 1649, and of Antwerp in 1607. The famous and well-known book *De Imitatione Christi*, which has been translated into almost all the languages of the world, though it has almost always been numbered among the works of Thomas à Kempis, is also found printed under the name of Gerson; and on the credit of some MSS. has been since ascribed to the abbot Gerson of the order of St. Benedict. This has occasioned a violent dispute between the canons of St. Augustin and the Benedictines: but while devout Christians find spiritual comfort in the work, the name of the writer is of small importance.

KEMPTER, an imperial town of Germany, in the circle of Suabia, situated on the river Iler. This town asserts that it is of greater antiquity than the imperial abbey which stands near it; and the latter again maintains that the town owes its walls and its very appearance of a town to the abbots, and was for a long time subject to them, not the least shadow of their independency appearing before the thirteenth century. In 1525, this town, for the sum of 30,000 gold guilders, purchased to itself all rights, prerogatives, profits, and perquisites, particularly all tolls and taxes, belonging to the abbey, both within and without the town; which compact received the sanction not only of the emperor Charles V. but also of all his successors, and likewise that of the see of Rome. By virtue thereof, the abbey is to build on its ground no more than what is absolutely necessary, and for its own service; and not to fortify the abbey, or raise any structures conducive thereto; nor within a mile of the town of Kempten, to hold, or cause to be held, any market, either public or private. In the year 1633, the town was taken, sword in hand, by the imperialists, with the slaughter of at least two thirds of the burghers. Its assessment in the matricula of the diet and circle was, in the year 1683, reduced from one hundred and fifty-six florins to fifty-two. To the imperial chamber at Wetzlar it pays forty rix-dollars, fifty-four kruitzers. It has no villages, but is possessed of lands, monies, tithes, and other incomes: thirty six miles S. Augsburg, and forty-four SE.. Ulm. Lon. 10. 33. E. Lat. 47. 47. N.

To KEN. *v. a.* (cennan, Saxon.) 1. To see at a distance; to descry (*Addison*). 2. To know: obsolete (*Gay*).

KEN. *s.* (from the verb.) view; reach of sight (*Shakspeare. Locke*).

KEN (Thomas), an excellent English bishop, was born at Berkhamstead in Hertfordshire, in 1637. He was educated at Winchester school, and then removed to New college, Oxford, where he was elected fellow, and took his degrees. About 1680 he was appointed chaplain to the princess of Orange, whom he accompanied to Holland. He afterwards attended Lord Dartmouth to Tangier, and on his return was made chaplain to Charles II. whom he visited on his death-bed, but was superseded by the Romish clergy. At this time he was made bishop of Bath and Wells, in which station his conduct was most exemplary. He opposed the designs of James to introduce popery, and was one of the seven bishops committed to the Tower for opposing the dispensing power. Yet he could not bring himself to transfer his allegiance from that monarch to William, on which account he was deprived. He then retired to the seat of lord Weymouth in Wiltshire, where he composed several pious works, and also an epic poem, entitled, Edmund. Queen Anne granted him a pension of 200l. a year. He died at Longleate in 1710. His works are in 4 v. 8vo.

KEN, a river of Scotland, which rises in the south-west part of Dumfrieshire, passes the Dalry, New Galloway, &c. in Kircudbrightshire, and joins the Dee in Kenmoor Loch.

KEN, a river of England, which rises about three miles east from Ambleside, in the county of Westmoreland, and runs into the Irish Sea, about six miles WNW. from Lancaster.

KEN, a river of England, in the county of Devon, which runs into the Ex, near its mouth.

KENDAL, a market town of Westmoreland, with a market on Saturday, and two fairs, on May 6, for horned cattle, and November 8, for horned catle, horses, and sheep. It is so called from its situation on the river Can, or Ken, and is a large town, well built and populous, driving a consider-

able trade in the woollen manufactures, as well as in stockings, cotton, &c. It had formerly a strong castle, parts of whose walls are yet standing. It has now a large church, and twelve chapels of ease. It was made a corporation first by queen Elizabeth, and afterwards by king James I. It consists of a mayor, twelve aldermen, twelve common council-men, and a recorder. Here is a good free school, well endowed, with exhibitions to Queen's college, Oxford. This town is built in form of a cross, having two chief streets, or rather four, which meet at the middle of the town, placed at right angles.

The tradesmen are divided into companies, namely, the mercers, sheermen, cordwainers, tanners, glovers, taylors, pewterers, &c. each of which have a place to meet in, to transact what relates to each particular company. By the late inland navigation it has communication with the rivers Mersey, Dee, Ribble, Ouse, Trent, Derwent, Severn, Humber, Thames, Avon, &c. which navigation, including its windings, extends above 500 miles in the counties of Lincoln, Nottingham, York, Lancaster, Chester, Stafford, Warwick, Leicester, Oxford, Worcester, &c. Here are kept the sessions of the peace for this part of the county, called the barony of Kendal; and there is a very great market on Saturday, with all kinds of provisions and woollen yarn, which the girls bring hither in large bundles. The river here, which runs half through the town in a stony channel, abounds with trout and salmon; and on the banks of it live the dyers and tanners.

The number of inhabitants in Kendal amounted to 6892 in the year 1800: since then there has been a small increase. Kendal is 258 miles NN. W. of London.

KE'NNEL. *s.* (*chenil*, French.) 1. A cot for dogs (*Sidney*). 2. A number of dogs kept in a kennel (*Shakspeare*). 3. The hole of a fox or other beast. 4. (*kennel*, Dutch; *chenil*, French.) The watercourse of a street (*Abuthnot*).

To KE'NNEL. *v. n.* (from the noun.) To lie; to dwell: used of beasts, and of man in contempt (*L'Estrange*).

KENNEL, a place or dwelling-house for hounds; and in a metaphorical sense, the pack of hounds itself.

To make a complete kennel, three points ought indispensably to be observed; sweet air, fresh water, and the morning-sun, for which the following rules may be useful:

Let the court be large, for the more spacious it is, the better it will be for the hounds to refresh themselves in; and let it be well walled, or fenced about, to prevent their getting out, yet the walling not so high as to keep out the sun or wind.

Let the water, if possible, run through some part of the court or yard; or for want thereof, have a well with a stone trough about a foot and a half high, always kept with fresh water, so that the hounds may drink at pleasure; and at one end of the trough let there be a hole to let out the water for cleansing it.

Let the kennel be built in the highest part of the court, in which there should be two rooms, one of them larger than the other, with a large chimney to make a fire when requisite.

This room should be raised about three feet from the ground, and in the floor there should be two gutters for the conveyance of the urine.

There should be dispersed up and down a variety of small bedsteads, raised a foot from the floor, with holes pierced through the planks for draining away their urine.

The other room is for the huntsman to keep his poles, whips, liams, medicines, and other necessaries in: there should be a copper for the boiling and dressing their food, when they come home wet and weary; at which times they should be cherished as instruments of recreation and profit, that they may delight in your service while they partake of your bounty.

For the sake of health there should be two kennels. In the winter season, if there be but one, it can be cleaned but seldom; and even then the hounds must be often comfortless, from the dampness necessarily resulting from the cleaning. Cleanliness nevertheless is so essentially necessary in every department of a kennel, that no continuance of health in the hounds, or excellence in the field, can be expected without it. These animals are innately clean; and will never, if they can avoid it, dung near where they lie. Air, fresh straw, and ample room for the occasional expansion of their weary limbs, are requisite for the invigoration of the frame, and the preservation of health. Hounds confined in a body are more liable to disease than if single, and in a state of unrestrained liberty; hence the necessity for counteraction, by every means the most prudent precaution can suggest. Hounds thus subject to disease, under the best and most judicious management, must be evidently much more so if surrounded with filth and an unventilated atmosphere.

The most renowned kennels in this kingdom were those of the late Duke of Richmond, the late Duke of Bedford, and of Sir William Rowley. The superb kennel of the Duke of Richmond is said to have cost 10,000l.; in the construction of which his grace is said to have been his own architect; to have dug his own flints, burnt his own lime, made his own bricks, and framed the wood-work in his own shops. The dog kennel stands alone, in the park; and forms a grand and striking object from the principal rooms of the mansion; the materials are flints, finished at all the angles by a light grey brick, like the Lymington white-stock.

The building is divided into five compartments; two of them 36 feet by 15, and the other three 30 by 15; these are called kennels, to which are annexed two feeding-rooms, 28 by 15. In each kennel there are openings at top, for the admission of external air when necessary, and stoves to attemper the air when too cold. There are also supplies of water, and drains emptying into what is termed a stank, at a considerable depth below, full of rain-water, from the surface of which to the rise of the arch is eleven feet; so that no inconvenience arises from smell, while the whole can be occasionally cleared off by drains and dung-pits to more dependent depths, where it becomes contributary to the purposes of agriculture. Round the whole building is a pave-

ment five feet wide; airing-yards, places for breeding, and other conveniencies, making a part of each wing. To complete the general intention, the huntsman and whipper-in have each a parlour, kitchen, and sleeping-room, appropriate to their own uses.

The late Duke of Bedford's was an establishment upon a scale far too extensive for minute description, as it includes tennis-court, riding-house, &c. &c. in one stone-fronted building, of 266 feet in length; with two wings of stables, containing stalls for thirty-six hunters, and eleven loose houses for horses sick or lame. Of all this mass of building the dog-kennel, properly so called, is 405 feet long, having the boiling-house in the centre, with feeding-rooms adjoining, and a granary behind. On the right of the centre are apartments for two kennel-keepers, two long lodging-rooms for the hunting hounds, with flues running along the walls, to preserve an equal temperature in the severity of the winter season; spacious yards to each, furnished with a fountain in the middle, for the dogs to drink at; and water-cocks fixed at proper distances, to cleanse the pavement, when it may be required: adjoining to these, are seven hospitals for sick and lame hounds, with yards to each. On the left are divisions for litter, straw, &c. eleven apartments for bitches and puppies, with yards to each; eleven ditto for bitches in pup, with yards also; and a large division for bitches at heat. In the front is a large reservoir of water, which supplies the fountains, and different cocks in the several yards within. Behind the whole is a large airing-ground, flesh-house, and a variety of other conveniencies. The huntsman's dwelling-house is a handsome building adjoining. The number of hunting hounds kept in the kennel are usually from sixty to seventy couple.

The kennel of Sir William Rowley is upon a much less scale than the two already described, but replete with every convenience that an establishment upon a small scale can possibly require: it is situate about half a mile from the family mansion, from the garden of which it forms a picturesque object. It is erected in a valley of the park, a spot well adapted to the purpose, being equally defended from the cutting easterly winds, and the heat of the sun in its meridian, by a thick skirting of park and forest trees. Not having the advantage of a rivulet to water the courts, that want is amply supplied by a pump, which, by means of different cocks, turns the water to every part of the premises. The hunting-kennel, or principal lodging-room, is 20 feet by 18 in the clear, 18 feet high, and paved with flag-stones. The beds, or benches, which cover almost the whole area, are admirably contrived, being lathed like bedsteads, made to fold up with joints, for the convenience of washing the floor beneath them. This room, by means of a flue of peculiar construction, is heated to any required temperature; and the hounds, after severe chases, and in wet weather, are rendered dry and comfortable in a much less time than they could be by any other method.

There is also a kennel, or lodging-room, for the young hounds, of the same dimensions, and possessing the same conveniencies, except the flue, which here would have been superfluous: several small kennels for bitches in a state of breeding, as well as a proportional number for those with puppies: a paved court to the hunting-kennel: a feeding-house; one-half of which is open, the other under cover: a paved court to the kennel for the young hounds: a pump, and stone water cisterns: a large grass-yard for airing the hounds belonging to the hunting-kennel, containing about an acre and three-quarters, in which is a variety of lime, chesnut, and other trees, forming an excellent shade during the summer season. The young hounds have a similar convenience, and have also twelve small kennels for puppies, well constructed for the purpose. The hunting-hounds generally consist of about thirty-six couple, and the whole establishment is conducted with admirable order, and reflects high credit upon its liberal and spirited owner.

Next to the choice of a judicious and convenient kennel, the management and feeding of the hounds becomes a matter of most serious consideration. The feeder should be a servant of strict sobriety, industry, and punctuality; of great humanity, and personal fidelity to his employer; as upon him in a great degree depends the health and preservation of the hounds. Mr. Beckford observes, and it is a proof of his practical knowledge and personal experience, that no part of a hunting establishment goes on so well as when the master becomes a frequent superintendant of his own concerns. He says, as the sport in the field depends on the exquisite sense of smelling so peculiar to the hound, so care should be taken to preserve it; and that cleanliness is the surest means. The keeping of the kennel sweet and clean, cannot therefore be too strongly impressed upon the mind of the feeder, who, if he seem habitually disposed to deviate from this point, is not at all calculated for the office he has undertaken.

The preparation for feeding, such as boiling the meat, mixing the meal, and getting it ready at stated hours, is a matter that the huntsman will of course take care to fulfil with punctuality; but there are other considerations, equally important and equally entitled to attention: Hounds cannot be properly fed by a single person; two at least are unavoidably necessary; and those two should be the feeder and the huntsman; as hounds should be drafted and fed according to their state of flesh and condition. Some are much more voracious than others, and will require a greater portion of food; some again look and work well, with half the quantity: the eye of the huntsman should discriminate between these descriptions; without which attention the pack will never be of equal appearance. When any of the hounds are observed to be low in flesh, off their appetites, bad feeders, or kept under by the old and master hounds, it will be matter of advantage to draft them, and let them feed under less restraint. Young and impatient feeders fall into the very common fault of feeding hounds with their meat too hot: it is a prevalent and injurious error that cannot be too soon abandoned.

Mr. Beckford is of opinion, that hounds poorer than the rest should be fed a second time; and that those which are become too fat should be drafted off, and not permitted to fill themselves. All hounds, and particularly young ones should be often called over in kennel, that their names may become familiar to them; this will teach them obedience, and is a lesson that should be especially practised at the time of feeding. The whole pack should be let out into the airing ground, to empty themselves after feeding, to

prevent an unnecessary accumulation of filth and fetid effluvia in the kennel. It is a custom with some, to shut up the hounds for two or three hours after they return from hunting, before they are fed; but it is a cruel and injurious custom; they should have their meat ready for feeding immediately on their return, and afterwards rest undisturbed upon a full stomach. Plenty of vegetables boiled in the copper with meat once a week, is the ration in most kennels. It is also customary to throw in a pound or two of sulphur, in proportion to the number, particularly in the summer season, when there is a greater tendency in the blood to morbid affections, and particularly to cutaneous diseases.

During the hot months, when hounds do not work, they require but a small proportion of substantial food, compared to what is necessary in the severity of the hunting season; flesh may then be given very sparingly, and the less it is used in the summer the better. Various opinions have been offered as to the best food for hounds in general, but experience sufficiently proves that no one kind should be exclusively adhered to; as the hounds are always in better health where an occasional change is allowed. Horse-flesh, sheep's trotters, raspings, greaves, bullocks' paunches (in a scarcity of flesh), oatmeal, and barley-meal, should constitute the principal articles; and these act much more profitably and advantageously when used in a state of nearly equal proportions, than when given separately.

Mr. Beckford says, his feeder, who was a good one, and of much experience, mixed his meal in equal quantities; that the oatmeal he boiled for half an hour, and then added the barley-meal raw, and stirred both together: his reason for boiling one and not the other, was, that boiling made the oat-meal thick, and the barley-meal thin; and hence when he fed with the barley-meal only, he never put it into the copper, but mixed it up with scalding liquor, in a tub or hogshead, kept for that purpose. Nice observation should be made upon the state of the bitches at all times; and upon the least indication of their going to heat, they should be instantly removed; a few hours delay may be the destruction of some of the best hounds in the kennel. After their return on a hunting-day, the feeder should also observe whether there be any hounds that have sustained injuries in the feet by thorns, flints, &c. in which case a fomentation of warm pot-liquor or bran and water, followed by a washing with cold vinegar, or salt and water, will generally effect a speedy cure. Hounds seriously lame, or sick, should be separated from the rest, and placed where they can be more at ease, and have better attention.

Kennel, applied to the fox in fox-hunting, is the spot to which, after his nocturnal depredations, he retires about the dawn of day. Being found by the hounds in drawing covert, he is said to be unkennelled, and the chase then begins. When safe in some burrow, or hole, below the surface, he is said to lie at earth.

KENNET (Dr. White), a learned English writer, and bishop of Peterborough, in the eighteenth century, bred at St. Edmund-hall, Oxford; where he soon distinguished himself by his vigorous application to his studies, and by his translations of several books into English, and other pieces which he published. In 1695 our author published his Parochial Antiquities. A sermon preached by him on the 30th of January, 1703, at Aldgate, exposed him to great clamour. It was printed under the title of A dispassionate Inquiry into the Causes of the Civil War. In 1706 he published his case of Impropriations, and two other tracts on the same subject. In 1708, he published the third volume of The Complete History of England (the two former volumes compiled by Mr. Hughes). In 1709, he published a Vindication of the Church and Clergy of England from some late Reproaches rudely and unjustly cast upon them; and a true Answer to Dr. Sacheverel's Sermon. When the great point in Dr. Sacheverel's trial, the change of the ministry, was gained, and very strange addresses were made upon it, there was to be an artful address from the bishop and clergy of London, and they who would not subscribe it were to be represented as enemies to the queen and the ministry. Dr. Kennet fell under this imputation. He was exposed to great odium as a low-church man, on account of his conduct and writings. In 1713, he presented the Society for propagating the Gospel with a great number of books suitable to their design; published his Bibliothecæ Americanæ Primordia, and founded an antiquarian and historical library at Peterborough. In 1715, he published a sermon, intitled The Witchcraft of the present Rebellion, and afterward several other pieces. In 1717, he was engaged in a dispute with Dr. William Nicholson, bishop of Carlisle, relating to some alterations in the bishop of Bangor's famous sermon; and disliked the proceedings of the Convocation against that bishop. Upon the death of Dr. Cumberland, bishop of Peterborough, he was promoted to that see, to which he was consecrated in 1718. He sat in it more than ten years, and died in 1728. He was an excellent philologist, a good preacher, whether in English or Latin, and well versed in the histories and antiquities of our nation.

Kennet (Basil), a learned English writer, and brother to the preceding, was educated at Corpus Christi College, in the University of Oxford, where he became fellow. In 1706, he went over chaplain to the English factory at Leghorn, where he met with great opposition from the Papists, and was in danger from the Inquisition. He died in the year 1714. He published Lives of the Greek Poets; the Roman Antiquities; a volume of Sermons preached at Leghorn; a translation into English of Puffendorf's Treatise of the Law of Nature and Nations. He was a man of most exemplary integrity, generosity, piety, and modesty.

Kennet, a river, which rises among the chalky hills in the middle of Wilts, and flows to Newbury in Berks, where it becomes navigable, and below which it is augmented by the Lamborn. It then keeps

along the southern edge of the county, till, turning up to Reading, it mingles with the Thames. Pope has celebrated this river, as

"The Kennet swift, for silver eels renown'd."

KENNICOTT (Dr. Benjamin), well known in the learned world for his elaborate edition of the Hebrew Bible and other valuable publications, was born at Totness in Devonshire, in the year 1718. With the rank and character of his parents we are entirely unacquainted; but it is certain they were unable to satisfy that thirst for knowledge which they could not but discover in their son. Some opportunities of early improvement must, however, have been afforded him, or (which we sometimes see) the natural vigour of his mind must have superseded the necessity of them. In the year 1744 he entered at Wadham College; nor was it long before he distinguished himself in that particular branch of study in which he afterwards became so eminent. His two dissertations, on the Tree of Life, and the Oblations of Cain and Abel, came to a second edition so early as the year 1747, and procured him the singular honour of a bachelor's degree conferred on him gratis by the university a year before the statutable time. The dissertations were gratefully dedicated to those benefactors whose liberality had opened his way to the university, or whose kindness had made it a scene not only of manly labour, but of honourable friendship. With such merit and such support, he was a successful candidate for a fellowship of Exeter College; and soon after his admission into that society, he distinguished himself by the publication of several occasional sermons. In the year 1753 he laid the foundation of that stupendous monument of learned industry, at which the wise and the good will gaze with admiration, when prejudice, and envy, and ingratitude, shall be dumb. This he did by publishing his first dissertation on the state of the printed Hebrew Text, in which he proposed to overthrow the then prevailing notion of its absolute integrity. The first blow, indeed, had been struck long before, by Capellus, in his Critica Sacra, published after his death by his son, in 1650;—a blow which Buxtorf, with all his abilities and dialectical skill, was unable to ward off. But Capellus having no opportunity of consulting manuscripts, though his arguments were supported by the authority of the Samaritan Pentateuch, of parallel passages, and of the ancient versions, could never absolutely prove his point. Indeed the general opinion was, that the Hebrew manuscripts contained none, or at least very few and trifling variations from the printed text: and with respect to the Samaritan Pentateuch, very different opinions were entertained. Those who held the Hebrew verity, of course condemned the Samaritan as corrupt in every place where it deviated from the Hebrew; and those who believed the Hebrew to be incorrect, did not think the Samaritan of sufficient authority to correct it. Besides, the Samaritan itself appeared to a very great disadvantage; for no Samaritan manuscripts were then known, and the Pentateuch itself was condemned for those errors which ought rather to have been ascribed to the incorrectness of the editions. In this dissertation, therefore, Dr. Kennicott proved that there were many Hebrew manuscripts extant, which, though they had hitherto been generally supposed to agree with each other, and with the Hebrew text, yet contained many and important various readings; and that from those various readings considerable authority was derived in support of the ancient versions. He announced the existence of six Samaritan manuscripts in Oxford only, by which many errors in the printed Samaritan might be removed; and he attempted to prove, that even from the Samaritan, as it was already printed, many passages in the Hebrew might undoubtedly be corrected. This work, as it was reasonable to expect, was examined with great severity both at home and abroad. In some foreign universities the belief of the Hebrew verity, on its being attacked by Capellus, had been insisted on as an article of faith—Ista Capelli sententia adeo non approbata fuit Fidei sociis, ut potius Helvetii theologi, et speciatim Genevenses, anno 1678, peculiari canone caverint, ne quis in ditione sua minister ecclesiæ recipiatur, nisi fateatur publice, textum Hebræum, ut hodie est in exemplaribus Masoreticis, quoad consonantes et vocales, divinum et authenticum esse (*Wolfii Biblioth.* Heb. tom. ii. 27). And at home this doctrine of the corrupt state of the Hebrew text was opposed by Comings and Bate, two Hütchinsonians, with as much violence as if the whole truth of the revelation were at stake.

The next three or four years of Dr. Kennicott's life were principally spent in searching out and examining Hebrew manuscripts, though he found leisure not only to preach, but to publish several occasional sermons. About this time Dr. Kennicott became one of the king's preachers at Whitehall; and in the year 1759 we find him vicar of Culham in Oxfordshire. In January 1760 he published his second dissertation on the state of the Hebrew Text; in which, after vindicating the authority and antiquity of the Samaritan Pentateuch, he disarmed the advocates for the Hebrew verity of one of their most specious arguments. They had observed, that the Chaldee Paraphrase having been made from Hebrew manuscripts near the time of Christ, its general coincidence with the present Hebrew Text must evince the agreement of this last with the manuscripts from which the paraphrase was taken. Dr. Kennicott demonstrated the fallacy of this reasoning, by shewing that the Chaldee Paraphrase had been frequently

corrupted, in order to reconcile it with the printed text; and thus the weapons of his antagonists were successfully turned upon themselves. He appealed also to the writings of the Jews themselves on the subject of the Hebrew Text, and gave a compendious history of it from the close of the Hebrew canon down to the invention of printing, together with a description of 103 Hebrew manuscripts which he had discovered in England, and an account of many others preserved in various parts of Europe. A collation of the Hebrew manuscripts was now loudly called for by the most learned and enlightened of the friends of biblical criticism; and in this same year (1760) Dr. Kennicott emitted his proposals for collating all the Hebrew manuscripts prior to the invention of printing, that could be found in Great Britain and Ireland, and for procuring at the same time as many collations of foreign manuscripts of note as the time and money he should receive would permit. His first subscribers were, the learned and pious Archbishop Secker, and the delegates of the Oxford press, who, with that liberality which has generally marked their character, gave him an annual subscription of 40l. In the first year the money received was about 500 guineas; in the next it rose to 900, at which sum it continued stationary till the tenth year, when it amounted to 1000. During the progress of the work the industry of our author was rewarded by a canonry of Christ Church. He was also presented, though we know not exactly when, to the valuable living of Mynhenyote, in Cornwall, on the nomination of the Chapter of Exeter. In 1776 the first volume was published, and in 1780 the whole was completed. If now we consider that above 600 manuscripts were collated, and the whole work occupied 20 years of Dr. Kennicott's life, it must be owned that sacred criticism is more indebted to him than to any scholar of any age. Within two years of his death, he resigned his living in Cornwall, from conscientious motives, on account of his not having a prospect of ever again being able to visit his parish. Although many good and conscientious men may justly think, in this case, that his professional labours carried on elsewhere might properly have entitled him to retain this preferment, and may apply this reasoning in other cases; yet a conduct so signally disinterested deserves certainly to be admired and celebrated. Dr. Kennicott died at Oxford, after a lingering illness, September 18, 1783; and left a widow, who was sister to the late Edward Chamberlayne, Esq. of the treasury. At the time of his death he was employed in printing Remarks on Select Passages in the Old Testament; which were afterwards published, the volume having been completed from his papers.

KENNINGTON, a village of Surrey, in the parish of Lambeth. Here is a barn, called the Long Barn, the remains of a royal palace, which was the residence, in particular of Edward the Black Prince. Kennington Common is the place of execution for the county of Surry.

KENO. See Kino.

KENRICK (William), an English writer, was born at Watford in Hertfordshire, and bred to the business of a rule-maker, which profession he abandoned for that of literature. To improve himself he went to Leyden, and afterwards settled in London, where he published, in 1759, Epistles, philosophical and moral, in verse. In 1766 appeared his comedy of Falstaff's Wedding, which, it must be admitted, is an admirable imitation of Shakspeare. He was for some time a writer in the Monthly Review, but having had a difference with the principal, he set up another, called The London Review, by way of opposition. He was also the first editor of the Morning Chronicle; but here, on account of some squabble, he broke off his engagement, and commenced a newspaper of his own. He translated Rousseau's Emilius and Eloisa, and other works, from the French, and published several original pieces. He died in 1777.

KENSINGTON, a village of England, in which is a royal palace, purchased by William III. of the Earl of Nottingham, and greatly improved by the queens Mary, Anne, and Caroline. It bears no external marks of magnificence, though some of the apartments are grand, and furnished with a few good paintings by capital masters. Genteel families reside there by permission of the king. The gardens are upwards of three miles in circumference: two miles west of London.

Kensington, a town of United America in the state of New Hampshire: 13 miles S. W. of Portsmouth.

KENT, a county of England, bounded on the north by the Thames and the German Ocean, on the east and south east by that ocean and the straits of Dover, on the south by Sussex and the English Channel, and on the west by Surrey. From east to west it is 58 miles, and from north to south 36. It is divided into five lathes, containing 61 hundreds, two cities, 29 market-towns, and 408 parishes; and sends 18 members to parliament. It contains about 1,248,000 acres of land; and in 1801 had 307,624 inhabitants, of whom nearly 77,000 were capable of bearing arms. In the soil and face of the country there is a great diversity. The banks of the Thames are low and marshy, but backed by a range of chalky eminences, sometimes rising to a moderate height. This kind of hard chalky soil, inclining to barrenness, extends to the north east extremity of the county, and thence round to Dover, exhibiting its nature in the lofty white cliffs, which here bound the island, and produce that striking appearance at sea which gave it the name of Albion. The south part of

Kent, called the Weald, is a flat, woody tract, of a clayey soil; fertile, but unwholesome on account of its moisture. The midland and western districts are a mixture of hill and vale, arable and pasture, equal in pleasantness to any part of England. This county produces, beside the usual objects of agriculture, large quantities of hops; fruit of various kinds, especially cherries and apples, of which there are large orchards for the London markets; madder for dying; timber in the woody parts; and birch twigs, for brooms, which form no inconsiderable article of commerce for the metropolis. The country inland from Dover, consisting chiefly of open downs, is excellent for the feeding of sheep, and many bullocks are fattened to an extraordinary size in Romney Marsh. The principal rivers, beside the Thames, are the Medway, Darent, Stour, Cray, and Rother. Maidstone is the county town. The hop-grounds of the parishes between Sandwich and Canterbury are those which produce the fine East Kent hops, so much sought after by the London brewers. But the principal hop-plantations are about Canterbury and Maidstone. In the neighbourhood of Maidstone are a great number of small fields, of from one to ten acres, and somewhat more, planted with fruit of different kinds, cherries, apples, and filberds, for which the rocky soil of the neighbourhood seems particularly adapted. The western part of this county consists of a great variety of soils and systems of management. It is much more enclosed than the eastern part, and produces more timber and underwood. The cities of Kent are Canterbury and Rochester. The towns are Maidstone, Dover, Romney, Sandwich, Hithe, Queenborough, Chatham, Woolwich, Greenwich, Deal, Tunbridge, Folkstone, Gravesend, Ashford, Dartford, Appledore, Cranbrook, Eltham, Bromley, Sevenoaks, Wye, Tenterden, Smarden, Goudhurst, Lenham, Malling, Lydd, Margate, Wrotham, Ramsgate, Elham, Milton, Feversham, Westerham, Deptford, Sittingburn, Northfleet, Crayford, and Folkingham. Two members are returned for each of the first eight, and for the county.

Kent, a county of United America, in the state of Rhode Island.

Kent, a county of United America, in the state of Delaware.

Kent, a county of United America, in the state of Maryland.

KENTISH-town a village of Middlesex, three miles north of London, near Hampstead much improved of late by several handsome houses belonging to the citizens of London, &c.

KENTAIFFE, Mount, a ridge of mountains, in the south part of Thibet, bordering on Hindoostan Proper. On the west side of this ridge are the two heads of the Ganges, and from its east side issues the Burrampooter.

KENTUCKY, one of the United States o America, bounded by Great Sandy Creek on the north, by the Ohio on the north west, by N Carolina on the south, and by the Cumberland mountain on the east. It is upwards of 250 miles in length, and 200 in breadth; and is divided into fourteen counties, Lincoln, Fayette, Bourbon, Mercer, Jefferson, Nelson, Maddison, Woodford, Mason, Washington, Clark, Scott, Logan, and Franklin, It contains 73,677 inhabitants, of whom 12,430 are slaves. The principal rivers are the Ohio, Kentucky, Licking River, Red River, Elkhorn, Dick's River, Green River, Cumberland River, and Great Kenhaway or New River. These are all navigable for boats almost to their sources, without rapids, for the greatest part of the year. The soil is amazingly fertile, and scarcely any such thing as a marsh or swamp is to be found. The air is more temperate and healthy than the other settled parts of America; and snow seldom falls deep or lies long. The country, in general, may be considered as well-timbered, producing large trees of many kinds, and to be exceeded by no country in variety. Those which are peculiar to Kentucky are the sugar-tree, which grows in great plenty, and furnishes excellent sugar; and the honey-locust, which is surrounded by large thorny spikes, bearing broad and long pods in form of peas, has a sweet taste, and makes excellent beer. Here are also the coffee-tree, the papwa, cucumber, black mulberry, wild cherry, buck-eye, and some other kinds of trees not common elsewhere. Here is great plenty of fine cane, on which the cattle feed, and grow fat: it grows from three to twelve feet high, with joints at eight or ten inches distance along the stalk, from which proceed leaves resembling those of the willow. Where no cane grows, there is abundance of wild rye, clover, and buffalo-grass, covering vast tracts of country, and affording excellent food for cattle. The fields are covered with abundance of herbage not common to other countries; and all the year, excepting the winter months, the plains and vallies are adorned with variety of flowers. Iron ore and lead are found in abundance: and there are many large caves, some of which extend several miles under a fine lime-stone rock, supported by curious arches and pillars. The waters produce plenty of fish and fowl, and especially on the Ohio, the geese and ducks are amazingly numerous. The land fowls are turkies; a species of grouse, which the inhabitants call pheasants; and quails, to which they give the name of partridges. Serpents are not numerous, and are such as are to be found in other parts of the continent, except the bull, the horned, and the mockason snakes. Among the native animals is the buffalo, whose flesh is excellent meat; and there are still to be found many deer, elks, and bears. Here are also panthers, wild cats, wolves, beavers, otters, minks,

foxes, rabbits, squirrels, racoons, ground hogs, pole-cats, and opossums. Most of the species of the domestic quadrupeds have been introduced since the settlement, such as horses, cows, sheep, and hogs. Lexington is the capital.

KENTUCKY, a river of North America, which rises with three heads from a mountainous part of the country of the same name. Its north branch, which interlocks with Cumberland River, falls into the Ohio in lat. 38. 27. N. It is amazingly crooked for upward of 200 miles in length; and its banks may rather be called precipices, for, almost every where they consist of three or four hundred feet of a solid perpendicular limestone rock; in some parts of a fine white marble, curiously arched, pillared, or blocked up into fine building stones. It is only at particular places that this river can be crossed, the best of which is near Leestown.

KEPLER (John), a very eminent astronomer and mathematician, was born at Wiel, in the county of Wirtemberg, in 1571. He was the disciple of Mæstlinus, a learned mathematician and astronomer, of whom he learnt those sciences, and became afterwards professor of them to three successive emperors, viz. Matthias, Rudolphus, and Ferdinand the 2nd.

To this sagacious philosopher we owe the first discovery of the great laws of the planetary motions, viz. that the planets describe areas that are always proportional to the times; that they move in elliptical orbits, having the sun in one focus; and that the squares of their periodic times, are proportional to the cubes of their mean distances; which are now generally known by the name of Kepler's Laws. But as this great man stands as it were at the head of the modern reformed astronomy, he is highly deserving of a pretty large account, which we shall extract chiefly from the words of that great mathematician Mr. Maclaurin.

Kepler had a particular passion for finding analogies and harmonies in nature, after the manner of the Pythagoreans and Platonists; and to this disposition we owe such valuable discoveries, as are more than sufficient to excuse his conceits. Three things, he tells us, he anxiously sought to find out the reason of, from his early youth; viz. Why the planets were six in number? Why the dimensions of their orbits were such as Copernicus had described from observations? And what was the analogy or law of their revolutions? He sought for the reason of the two first of these, in the properties of numbers and plane figures, without success. But at length reflecting, that while the plane regular figures may be infinite in number, the regular solids are only five, as Euclid had long ago demonstrated: he imagined, that certain mysteries in nature might correspond with this remarkable limitation inherent in the essences of things; and the rather, as he found that the Pythagoreans had made great use of those five regular solids in their philosophy. He therefore endeavoured to find some relation between the dimensions of these solids and the intervals of the planetary spheres; thus, imagining that a cube, inscribed in the sphere of Saturn, would touch by its six planes the sphere of Jupiter; and that the other four regular solids in like manner fitted the intervals that are between the spheres of the other planets: he became persuaded that this was the true reason why the primary planets were precisely six in number, and that the author of the world had determined their distances from the sun, the centre of the system, from a regard to this analogy. Being thus possessed, as he thought, of the grand secret of the Pythagoreans, and greatly pleased with his discovery, he published it in 1596, under the title of Mysterium Cosmographicum; and was for some time so charmed with it, that he said he would not relinquish the honour of having invented what was contained in that book, for the electorate of Saxony.

Kepler sent a copy of this book to Tycho Brahe, who did not approve of those abstract speculations concerning the system of the world, but wrote to Kepler, first to lay a solid foundation in observations, and then, by ascending from them, to endeavour to come at the causes of things. Tycho however, pleased with his genius, was very desirous of having Kepler with him to assist him in his labours: and having settled, under the protection of the emperor, in Bohemia, where he passed the last years of his life, after having left his native country on some ill usage, he prevailed upon Kepler to leave the university of Gratz, and remove into Bohemia with his family and library, in the year 1600. But Tycho dying the next year, the arranging the observations devolved upon Kepler, and from that time he had the title of mathematician to the emperor all his life, and gained continually more and more reputation by his works. The emperor Rudolph ordered him to finish the tables of Tycho Brahe, which were to be called the Rudolphine Tables. Kepler applied diligently to the work: but unhappy are those learned men who depend upon the good humour of the intendants of the finances; the treasurers were so ill affected towards our author, that he could not publish these tables till 1627. He died at Ratisbon in 1630, where he was soliciting the payment of the arrears of his pension.

Kepler made many important discoveries from Tycho's observations, as well as his own. He found, that astronomers had erred, from the first rise of the science, in ascribing always circular orbits and uniform motions to the planets; that, on the contrary, each of them moves in an ellipsis which has one of its foci in the sun: that the motion of each is really unequable, and varies so, that a ray supposed to be always drawn from the planet to the sun describes equal areas in equal times.

It was some years later before he discovered the analogy there is between the distances of the several planets from the sun, and the periods in which they complete their revolutions. He easily saw, that the higher planets not only moved in greater circles, but also more slowly than the nearer ones; so that, on a double account, their periodic times were greater. Saturn for example, revolves at a distance from the sun nine times and a half greater than the earth's distance from it; and the circle described by Saturn is in the same proportion: but as the earth revolves in one year, so, if their velocities were equal, Saturn ought to revolve in nine years and a half; whereas the periodic time of Saturn is about 29 years. The periodic times of the planets increase, therefore, in a greater proportion than their distances from the sun: but yet not in so great a proportion as the squares of those distances; for,

if that were the law of the motions (the square of nine and a half being 90¼), the periodic time of Saturn ought to be above 90 years. A mean proportion between that of the distances of the planets, and that of the squares of those distances, is the true proportion of the periodic times; as the mean distance between nine and a half and its square 90¼ gives the periodic time of Saturn in years. Kepler, after having committed several mistakes in determining this analogy, hit upon it at last, May the 15th, 1618; for he is so particular as to mention the precise day when he found that "the squares of the periodic times were always in the same proportion as the cubes of their mean distances from the sun."

When Kepler saw, according to better observations, that his disposition of the five regular solids among the planetary spheres was not agreeable to the intervals between their orbits, he endeavoured to discover other schemes of harmony. For this purpose, he compared the motions of the same planet at its greatest and least distances, and of the different planets in their several orbits, as they would appear viewed from the sun; and here he fancied that he found a similitude to the divisions of the octave in music. These were the dreams of this ingenious man, which he was so fond of, that, hearing of the discovery of four new planets (the satellites of Jupiter) by Galileo, he owns that his first reflections were from a concern how he could save his favourite scheme, which was threatened by this addition to the number of the planets. The same attachment led him into a wrong judgment concerning the sphere of the fixed stars: for, being obliged, by his doctrine, to allow a vast superiority to the sun in the universe, he restrains the fixed stars within very narrow limits. Nor did he consider them as suns, placed in the centres of their several systems, having planets revolving round them, as the other followers of Copernicus have concluded them to be, from their having light in themselves, from their immense distances, and from the analogy of nature. Not contented with these harmonies, which he had learned from the observations of Tycho, he gave himself the liberty to imagine several other analogies, that have no foundation in nature, and are overthrown by the best observations. Thus from the opinions of Kepler, though most justly admired, we are taught the danger of espousing principles, or hypotheses, borrowed from the abstract sciences, and of applying them with such freedom to natural inquiries.

Kepler's great sagacity, and continual meditations on the planetary motions, suggested to him some views of the true principles from which these motions flow. In his preface to the Commentaries concerning the planet Mars, he speaks of gravity as of a power that was mutual between bodies, and tells us, that the earth and moon tend towards each other, and would meet in a point, so many times nearer to the earth than to the moon, as the earth is greater than the moon, if their motions did not hinder it. He adds, that the tides arise from the gravity of the waters towards the moon. But not having notions sufficiently just of the laws of motion, it seems he was not able to make the best use of these thoughts; nor does it appear that he adhered to them steadily, since in his Epitome of Astronomy, published many years after, he proposes a physical account of the planetary motions, derived from different principles.

He supposes, in that treatise, that the motion of the sun on his axis, is preserved by some inherent vital principle; that a certain virtue, or immaterial image of the sun, is diffused with his rays into the ambient spaces, and, revolving with the body of the sun on his axis, takes hold of the planets, and carries them along with it in the same direction; like as a loadstone turned round near a magnetic needle, makes it turn round at the same time. The planet according to him, by its inertia, endeavours to continue in its place, and the action of the sun's image and this inertia are in a perpetual struggle. He adds, that this action of the sun, like his light, decreases as the distance increases; and therefore moves the same planet with greater celerity when nearer the sun, than at a greater distance. To account for the planet's approaching towards the sun as it descends from the aphelion to the perihelion, and receding from the sun while it ascends to the aphelion again, he supposes that the sun attracts one part of each planet, and repels the opposite part; and that the part attracted is turned towards the sun in the descent, and the other towards the sun in the ascent. By suppositions of this kind he endeavours to account for all the other varieties of the celestial motions.

But, now that the laws of motion are better known than in Kepler's time, it is easy to shew the fallacy of every part of this account of the planetary motions. The planet does not endeavour to stop in consequence of its inertia, but to persevere in its motion in a right line. An attractive force makes it descend from the aphelion to the perihelion in a curve concave towards the sun: but the repelling force, which he supposed to begin at the perihelion, would cause it to ascend in a figure convex towards the sun. There will be occasion to shew afterwards, from Sir Isaac Newton, how an attraction or gravitation towards the sun, alone produces the effects, which, according to Kepler required both an attractive and repelling force; and that the virtue which he ascribed to the sun's image, propagated into the planetary regions, is unnecessary, as it could be of no use for this effect, though it were admitted. For now his own prophecy, with which he concludes his book, is verified; where he tells us, that "the discovery of such things was reserved for the succeeding ages, when the author of nature would be pleased to reveal these mysteries."

The works of this celebrated author are many and valuable; as, 1. His Cosmographical Mystery, in 1596. 2. Optical Astronomy, in 1604. 3. Account of a New Star in Sagittarius, 1605. 4. New Astronomy; or, Celestial Physics, in Commentaries on the planet Mars. 5. Dissertations; with the Nuncius Siderius of Galileo, 1610. 6. New Gauging of Wine Casks, 1615. Said to be written on occasion of an erroneous measurement of the wine at his marriage by the revenue officer. 7. New Ephemerides, from 1617 to 1620. 8. Copernican System, three first books of the, 1618. 9. Harmony of the world; and three books of Comets, 1619. 10. Cosmographical Mystery, 2d edition, with Notes, 1621. 11. Copernican Astronomy; the three last books, 1622. 12. Logarithms, 1624; and the Supplement in 1625. 13. His Astronomical Tables, called the Rudolphine Tables, in honour of the emperor Rudolphus, his great and learned patron, in 1627. 14. Epitome of the Copernican Astronomy, 1635. Beside these, he wrote several

pieces on various other branches, as Chronology, Geometry of Solids, Trigonometry, and an excellent treatise of Dioptrics, for that time.

A very interesting account of the Astronomical Discoveries of Kepler was published in 1804, by the late Dr. Small of Dundee.

KEPLER'S *Laws*, are those laws of the planetary motions discovered by Kepler. These discoveries in the mundane system, are commonly accounted two, viz. 1st, That the planets describe about the sun, areas that are proportional to the times in which they are described, namely, by a line connecting the sun and planet; and 2d, That the squares of the times of revolution, are as the cubes of the mean distances of the planets from the sun. Kepler discovered also that the orbits of the planets are elliptical.

These discoveries of Kepler, however, were only found out by many trials, in searching among a great number of astronomical observations and revolutions, what rules and laws were found to obtain. On the other hand, Newton has demonstrated, a priori, all these laws, shewing that they must obtain in the mundane system, from the laws of gravitation and centripetal force; viz. the first of these laws resulting from a centripetal force urging the planets towards the sun, and from the centripetal force being in an inverse ratio of the square of the distance. And the elliptic form of the orbits, from a projectile force regulated by a centripetal one.

KEPLER'S *Problem*, is the determining the true from the mean anomaly of a planet, or the determining its place, in its elliptic orbit, answering to any given time; and so named from the celebrated astronomer Kepler, who first proposed it. See ANOMALY.

The general state of the problem is this: to find the position of a right line, which, passing through one of the foci of an ellipsis, shall cut off an area which shall be in any given proportion to the whole area of the ellipsis; which results from this property, that such a line sweeps areas that are proportional to the times.

Many solutions have been given of this problem, some direct and geometrical, others not: viz. by Kepler, Bulliald, Ward, Newton, Keill, Machin, &c. See *Newton's Princip.* lib. 1. prop. 31, *Keill's Astron. Lect.* 23, *Philos. Trans.* abr. vol. 8. p. 73. *Hellins in Phil. Trans.* and *Ivory in the Edinburgh Transactions.*

K'EPT. The pret. and part. pass. of *keep.*

KERA'NA. The name of a wind instrument forming a kind of long trumpet, much used by the Persians. Every evening at sun-set, and two hours after midnight, they sound the Kerana, together with hautboys, timbrels, drums, and other instruments.

KE'RATOPHYTUM. See GORGONIA.

KERCHE'IF. *s.* (*covrechief, Chaucer; couvre*, to cover, and *chef*, the head.) 1. A head-dress (*Shakspeare*). 2. Any loose cloth used in dress (*Hayward*).

KERCHE'IFED. } *a.* (from *kerchief.*)
KERCHE'IFT. } Dressed; hooded (*Mil.*)

KERCOLANG, an island of Asia, in the Indian Ocean. It is between 80 and 100 miles in circumference, and, in general, of a very good height. The face of the country seems to be steep hills and extensive valleys, and every part to be covered with trees and verdure, with some pleasant cultivated grounds. The houses stand on posts, and appear to be well-built, and neatly thatched. Their fishing-hooks and lines are mostly European; and the inhabitants are Malays. Their clothing, in general, is made of a coarse kind of calico, though some wear silk, and most of them have a kind of turban round their head; and a few have been seen with a Chinese pointed hat. They are a mild and apparently quiet people: and the confidence they put in strangers proves that the latter are not unwelcome guests. Lon. 126. 31. E. Lat. 4. 28. N.

KERF. *s.* (ceorfan, Saxon, to cut.) The sawnaway slit between two pieces of stuff (*Moxon*).

KERGUELEN'S LAND, an island in the Southern Ocean, visited by Captain Cook in 1779. From its sterility, it might properly have been called the Island of Desolation: but Captain Cook was unwilling to rob M. Kerguelen of the honour of its bearing his name. Mr. Anderson, who accompanied Captain Cook in this voyage, says, that no place hitherto discovered in either hemisphere affords so scanty a field for the naturalist as this spot. Some verdure indeed appeared, when at a small distance from the shore, which might raise the expectation of meeting with a little herbage; but all this lively appearance was occasioned by one small plant, resembling saxifrage, which grew upon the hills in large spreading tufts, on a kind of rotton turf, which, if dried, might serve for fuel, and was the only thing seen here that could possibly be applied to that purpose. Lon. 69. 37. E. Lat. 49. 3. S.

KERI-CETIB are various readings in the Hebrew Bible: *keri* signifies that which is read; and *cetib* that which is written. For where any such various readings occur, the wrong reading is written in the text, and that is called the *cetib*; and the true reading is written in the margin with ק under it, and called the *keri*. It is generally said by the Jewish writers, that these corrections were introduced by Ezra; but it is most probable that they had their original from the mistakes of the transcribers after the time of Ezra, and the observations and corrections of the Masorites. Those Keri-cetibs which are in the sacred books written by Ezra himself, or which were taken into the canon after his time, could not have been noticed by Ezra himself; and this affords a presumption, that the others are of late date. These words amount to about 1000; and Dr. Kennicott, in his Dissertatio Generalis, remarks, that all of them, excepting fourteen, have been found in the text of manuscripts.

KERMAN, a province of Persia, lying on the gulph of Persia. Here are sheep, which, after grazing from January to May, have their fleeces fall off their back, and become as naked as sucking pigs; and the inhabitants drive a great trade in their wool. Kerman is the capital.

Kerman, a town of Persia, capital of a province of the same name. It is 120 miles north of Gombroon. Lon. 57. 55. E. Lat. 29. 40. N.

KERMES, (*Kermes*, from *chermah*, Arab.) *Granum tinctorium. Coccus baphica.* Round reddish grains, about the size of peas, found in Spain, Italy, and the south of France, adhering to the branches of the scarlet oak. They are the nidus of a minute red animalcule, called *Coccus ilicis* of Linnéus. The *confectio alkermes*, now obsolete, was prepared with these, and possessed corroborant and adstringent virtues. See Kermeh.

Kermes *Oak*, in botany. See Quercus.

Ke'rmes *Mineral*, in the medical vocabulary, the *coccus ilicis* R. C.; which appears to be that used by all ancient nations; and Professor Tyschsen even supposes it was known to Moses under the name of *tola*. It was employed for giving the ground to clothes intended to be dyed with the rich purple. To the Greeks and Romans it was known by the name of coccum squarlatinum, coccus bapticus or baptica, insectorius, grana tinctorium; and the preference was given to that collected in Galatia and Armenia. It therefore appears to have been one of the most ancient of all the dyeing drugs, and that which produces the colour called coccus by the Romans, and originally known in England by the name of scarlet.

Kermeh, or *kermez*; its Arabic name, imports a little worm; whence the terms *carmine*, *cramousi*, and *crimson*: for carmine was formerly prepared from the kermes, or coccus ilicis, though now more generally obtained from the coccus cacti, or modern *cochineal.* From the Latin term *coccus* arose this Spanish diminutive, which is equally applicable to both the above insects, though in the present day more generally appropriated to the coccus of the opuntia, cactus, or napal. In the middle ages the kermes was denominated vermiculum (little worm), whence vermeil, or vermilion, although these terms are now transferred to pulverized cinnabar; from an animal to a mineral red.

For the etymology of the kermes, see Coccus.

It is the female alone, and in her impregnated state that forms the true kermes; as it is the female cochineal insect alone in her impregnated state that forms the true cochineal. In this state she becomes extremely sluggish, and pertinaciously adheres to the leaves of the quercus ilicis, or holm-oak. At this period she loses the form of an insect, and appears like a small roundish grain, about the size of a pea, of a reddish brown colour, in which is inclosed a very great quantity of eggs of a deeper red colour. From this peculiar form the kermes was, for a long time, taken for the seeds, or an excrescence of the tree on which it lived: whence these supposed seeds were called *grains* of kermes. Pliny seems to have adhered to the common opinion, although he supposes that the protuberance, be it what it might, would ultimately produce a worm "*coccum ilicis celerrime in vermiculum se mutan.*"

The first who has spoken of this insect with any precision is Peter de Quinqueran, Bishop of Senez, in a work entitled De Laudibus Provinciæ, published in 1550. Its history may likewise be seen written by Nissole, in the *Mem. del Acad. des Sciences* for 1714, and more particularly in the *Memoires des Insectes de Reaumer*, tom. iv.

The kermes is fixed to the bark of the shrub by a cottony down, the production of the insect. Chaptal has observed that this down, as well as that afforded by all other insects of this genus, possesses several characters of the caoutchouc, or Indian rubber; that it is insoluble in alkohol; that it melts at a boiling heat, and that it burns on the coals with a flame.

According to the manner of collecting this insect, we are informed by Berthollet, to whom Chaptal sent the account, that a single person is able to gather one or two pounds per day. They begin to collect towards the middle of the month of May, when the insect has attained its ordinary size; and the harvest continues till the middle of June, and sometimes longer. They are generally collected by women. At the beginning, from the juice of the fresh kermes weighing heavier than at the end, when it is drier and light, it only sells for 15 or 20 sous per pound, whilst when the harvest is nearly over, it fetches from 30 to 40. Those who buy it are obliged, as soon as possible, to prevent the hatching of the eggs. In order, therefore, to destroy the young, they steep the kermes for ten or twelve hours in vinegar, or expose it to the vapours, which only takes up half an hour. It is then dried on linen cloths. This process gives it a vinous red colour.

According to Lewis and Berthollet, fresh kermes, or the living insects, by expression afford a red juice, which has rather an agreeable odour, and a somewhat bitter, rough and pungent taste. In its dried state, it imparts the same odour and flavour to watery and spiritous liquors, to which it communicates its deep red colour. The extracts obtained from their tinctures by inspissation, retain their colour and lose very little of their savour; but the aqueous extract looses all its smell. The moodants for this colouring matter of kermes are alum and tartar. In order to prepare the wool for the kermes dye, it is to be boiled in water with about one-fifth its weight of alum, and half as much tartar, for two hours, and then left in the same liquor for four or five days; when being rinsed, it is dyed in the usual way, with about 12 ounces of kermes for every pound of wool. These scarlets were called grain-colours, from the insect being mistaken for a grain, and Venice

scarlet, from being chiefly manufactured at Venice. Wool prepared with a nitro muriatic solution of tin (as is done for the cochineal scarlet) and dyed with kermes, takes a kind of aurora or reddish orange colour. The red colour that kermes communicates to wool has less splendour than the scarlet of the cochineal; which last has been generally preferred to it, since the art has been known of using the solution of tin. But although the kermes red or scarlet is less vivid, it is more durable than that of cochineal, and much less liable to be changed by soap, acid, mud, &c.; hence grease spots may be effaced without changing it. The fine blood reds seen at this time on old tapestries in different parts of Europe, as for instance, those at Brussels observed by Hellot, and at the other manufactories of Flanders, were all dyed from kermes with the aluminous basis on woollen yarn, and they are still unfaded, having scarcely lost any of their liveliness; although many of them have stood between two and three hundred years. From the solidity of this dye, it is to be regretted that it is abandoned by the dyers; some indeed mix a small quantity of it with the cochineal, as it gives a greater body to the colour; but it diminishes its bloom. According to Berthollet, the colour produced by half kermes and half madder is called scarlet in half grain: this mixture affords a very permanent dye, but is not lively; and inclines a little to the blood red. The turbans manufactured at Orleans for the Levant are said to be dyed in this way; although a little Brasil wood is probably added. Dyers have only been able to give silk with kermes a dull reddish colour. According to Bancroft, cotton prepared with the aluminous mordant, and dyed with kermes, exhibits a fine red, inclining to the crimson shade; but this will gradually though slowly discharge, and the colour be weakened in washing. This chemist is in hopes of succeeding in fixing the colour of kermes more permanently on cotton.

KERN. *s.* (Irish.) Irish foot-soldier; an Irish boor (*Philips*).

Kern. *s.* A handmill consisting of two pieces of stone, by which corn is ground.

To Kern. *v. a.* (probably from kernel.) 1. To harden as ripened corn (*Carew*). 2. To take the form of grains; to granulate (*Grew*).

KE'RNEL. *s.* (cyrnel, a gland, Saxon.) 1. The edible substance contained in a shell. 2. Any thing included in a husk or integument (*Denham*). 3. The seed of pulpy fruits (*Bacon*). 4. The central part of any thing upon which the ambient strata are concreted (*Arbuthnot*). 5. Knobby concretions in children's flesh.

To Ke'rnel. *v. n.* (from the noun.) To ripen to kernels (*Mortimer*).

KE'RNELLY. *a.* (from *kernel.*) Full of kernels; having the quality or resemblance of kernels.

KERNELWORT, in botany. See Scrophularia vulgaris.

KERRY, a county of Ireland, in the province of Munster, 57 miles long and 46 broad; bounded on the E. by the counties of Limerick and Cork, on the W. by the Atlantic Ocean, on the N. by the Shannon, which separates it from Thomond, and on the S. by Desmond and the ocean. It is a mountainous country, but in many places are good corn-fields. It contains 84 parishes, and sends eight members to parliament. Ardfert is the capital.

KERSEY, a kind of coarse woollen cloth, made chiefly in Kent and Devonshire.

KERSEYMERE, a finer kind of woollen cloth, principally used in making waistcoats and breeches.

KERTSCH, a fortress, situate on the E. coast of the Crimea, near the N. entrance of the straits of Caffa. This fortress, and that of Yenikale, are of the greatest importance, as they command the passage which forms the communication between the sea of Asoph and the Black Sea.

KESITAH. This word is to be met with in Genesis and in Job, and is translated in the Septuagint and Vulgate, sheep or lambs. But the Rabbins and modern interpreters are generally of opinion, that *kesitah* signifies rather a piece of money. Bochart and Eugubinus are of opinion the Septuagint meant *minæ*, and not lambs; in Greek *hecatonmnon*, εκατονμνων, instead of εκατον αμνων. Now a mina was worth 60 Hebrew shekels, and consequently 6l. 6s. 10½d. sterling. M. de Pelletier of Rouen is of opinion, that kesitah was a Persian coin, stamped on one side with an archer (*kesitah* or *keseth* in Hebrew signifying *a bow*), and on the other with a lamb.

KESSEL (John van), an eminent painter, born at Antwerp in 1626. He became exceedingly famous as a painter of flowers, birds, and insects, which he executed according to the different seasons of the year. His pieces of this kind are very scarce and dear. He was also eminent in portrait painting, and his manner very much resembled that of Vandyck.

Kessel (Ferdinand van), the son of the above, born at Breda in 1660. He painted in the same line as his father, though not equal to him. John Sobieski king of Poland gave him apartments in his palace.

Kessel (N. van), nephew of the last-mentioned, was born at Antwerp in 1684. He painted conversations in the style of Teniers, with great life and humour. He inherited his uncle's fortune, which he dissipated in extravagance, and died in poverty.

Kessel, a town of Prussian Guelderland, with a handsome castle, seated on the Maese, between Ruremond and Venlo. Lon. 5. 49 E. Lat. 51. 16 N.

KESSELDORF, a village of Upper Saxony, three miles below Dresden, remarkable for a victory gained by the king of Prussia over the Saxons in 1745.

KEST. The preterit tense of *cast* (*Fairfax*).

KESTEVEN, one of the three divisions of Lincolnshire, containing the W. part of the county, from the middle to the S. extremity. Part of the fens of Lincolnshire are in this dis-

trict; the air of which, however, is more salubrious than that of the district of Holland: and the soil is more fruitful.

KESTRIL, in ornithology. See FALCO.

KESWICK, a town in Cumberland, with a market on Saturday; seated in a vale surrounded by hills, near the rapid river Greeta, 25 miles N.W. of Kendal, and 287 N.N.W. of London. Lon. 3. 16 W. Lat. 58. 35 N.

KESWICK, (Vale of), a delightful spot in the southern part of Cumberland, lately much visited by the admirers of nature. Here is the lake of Keswick, or, more properly, the lake of Derwent-water. To the N. of this romantic piece of water soars the lofty mountain Skiddaw, one of the most distinguished in England, and the haunt of eagles and other birds of prey. To the S. is the dreary region of Borrowdale. The water of the Derwent-water is subject to violent agitations, and often without any apparent cause. It has one peculiar characteristic; namely, that it retains its form, viewed from any point, and never assumes the appearance of a river.

KETCH, a vessel equipped with two masts, viz. the main-mast and the mizen-mast, and usually from 100 to 250 tons burthen. Ketches are principally used as yachts for conveying princes of the blood, ambassadors, or other great personages, from one place to another. Ketches are likewise used as bomb vessels, and are therefore furnished with all the apparatus necessary for a vigorous bombardment.

KETCHES (Bomb), are built remarkably strong, as being fitted with a greater number of riders than any other vessel of war; and indeed this reinforcement is absolutely necessary to sustain the violent shock produced by the discharge of their mortars, which would otherwise in a very short time shatter them to pieces.

KETTERING, a town of Northamptonshire, with a market on Friday. It is pleasantly seated on an ascent, and is a pretty good place, with a session-house for the justices, where they sometimes meet. It is 12 miles N. E. of Northampton, and 75 N.W. of London. Lon 0. 59 E. Lat. 52. 20 N.

KETMIA BLADDER, in botany. See HIBISCUS.

KETTLE. *s.* (cetl, Saxon.) A vessel in which liquor is boiled (*Dryden*).

KETTLEDRUM. *s.* (*kettle* and *drum.*) A drum of which the head is spread over a body of brass (*Shakspeare*).

KETTLEWELL (John), a pious English divine, born at North Allerton in Yorkshire, in 1653. He was educated at St. Edmund's hall, Oxford, and afterwards was chosen fellow of Lincoln college, Oxford, where he became an eminent tutor. In 1681 he published his book, entitled, Measures of Christian Obedience, which brought him considerable reputation, and the vicarage of Coleshill in Warwickshire, given him by lord Digby. At the revolution he refused the oaths to William and Mary, and in consequence was deprived of his preferment. He then settled in London, where he was held in great esteem by all good men. He died in 1695. His works have been published in two volumes folio, with a fine character of the author by Mr. Nelson.

KETTON, a village in the county of Rutland, about 6 miles west of Stamford, celebrated for its stone quarries, from which the stones with which King's College chapel, Cambridge, and other buildings of that age, were erected.

KETTON STONE, in mineralogy. See MARMOR.

KEVELS in ship-building, a frame composed of two pieces of timber, whose lower ends rest in a sort of step or foot, nailed to the ship's side, from whence the upper ends branch outward into arms or horns, serving to belay the great ropes by which the bottoms of the mainsail and fore-sail are extended.

KEW, a village of Surrey, on the banks of the Thames, about seven miles W. by S. of London. It was formerly a hamlet of Kingston; but in 1769 an act of parliament was obtained, forming Kew and Petersham into one vicarage. Here is Kew House, a royal palace, celebrated for its fine gardens, and his majesty's exotic garden. The last has been brought to great perfection by the introduction of many new plants from Africa and New South Wales; and is known throughout all Europe by the late Mr. Aiton's Hortus Kewensis. From Kew to Brentford is a handsome stone bridge of seven arches over the Thames, built in 1789, from a design of the late Mr. Paine. Kew gardens are open to the public every Monday, from midsummer to the end of autumn.

KEXHOLM, a town of Russia, in the government of Viborg. The town is built on two islands at the mouth of a river, on the side of lake Ladoga. The houses are of wood, but the town is well fortified, and defended with a citadel: forty miles E.N.E. Viborg, and sixty-eight N. Petersburg. Lon. 30. 25 E. Lat. 61. 0 N.

KEY, an instrument for the opening of locks. (See LOCK.) L. Molinus has a treatise on keys, *De clavibus veterum*, printed at Upsal: he derives the Latin name *clavis* from the Greek *κλειω*, *claudo*, I shut; or from the adverb *clam*, privately; and adds, that the use of keys is yet unknown in some parts of Sweden. The invention of keys is owing to one Theodore of Samos, according to Pliny and Polydore Virgil: but this must be a mistake, the use of keys having been known before the siege of Troy; mention even seems made of them in the 19th chapter of Genesis.

KEY, or KEY-STONE OF AN ARCH OR VAULT, is the last stone placed a-top thereof; which being wider and fuller at the top than bottom, wedges, as it were, and binds all the rest. The key is different in the different orders: in the Tuscan and Doric it is a plain stone, only projecting; in the Ionic it is cut and waved somewhat after the manner of consoles; in the Corinthian and Composite it is a console enriched with sculpture, foliages, &c.

Key is also used for ecclesiastical jurisdiction; particularly for the power of excommunicating and absolving. The Romanists say, the pope has the power of the keys, and can open and shut paradise as he pleases; grounding their opinion on that expression of Jesus Christ to Peter, "I will give thee the keys of the kingdom of heaven." In St. Gregory we read, that it was the custom heretofore for the popes to send a golden key to princes, wherein they inclosed a little of the filings of St. Peter's chains kept with a world of devotion at Rome; and that these keys were worn in the bosom, as being supposed to contain some wonderful virtues.

Key is also used for an index or explanation of a cipher. See Cipher.

Key or Quay, a long wharf, usually built of stone, by the side of a harbour or river, and having several storehouses for the convenience of lading and discharging merchant ships. It is accordingly furnished with posts and rings, whereby they are secured; together with cranes, capsterns, and other engines, to lift the goods into or out of the vessels which lie along side. The verb *cajare*, in old writers, according to Scaliger, signifies to keep in or restrain; and hence came our term key or quay, the ground where they are made being bound in with planks and posts.

Keys are also certain sunken rocks lying near the surface of the water, particularly in the West Indies.

Key, in music, is a certain fundamental note, or tone, to which the whole piece, be it concerto, sonata, cantata, &c. is accommodated; and with which it usually begins, but always ends.

To get an idea of the use of the key, it may be observed, that as in an oration there is a subject, viz. some principal person or thing to which the discourse is referred, and which is always to be kept in view, that nothing unnatural, and foreign to the subject, may be brought in; so in every regular piece of music there is one note, viz. the key, which regulates all the rest. The piece begins and ends in this; and this is, as it were, the musical subject, to which a regard must be had in all the other notes of the piece. Again, as in an oration there are several distinct articles, which refer to different subjects, yet so as they have all a visible connection with the principal subjects, which regulates and influences the whole; so in music there may be various subaltern subjects, that is, various keys, to which the different parts of the piece may belong: but then they must be all under the influence of the first and principal key, and have a sensible connection with it.

To give a more distinct notion of the key, we must observe, that the octave contains in it the whole principles of music, both with respect to consonance or harmony, and succession or melody; all the intervals in the regular octave being constituted of whole tones, except two which are semitones: and if either scale be continued to a double octave, there will, in that case, be seven different orders of the degrees of an octave, proceeding from the seven different letters, with which the terms of the scale are marked. Any given sound, therefore, i. e. a sound of any determinate pitch or tune, may be made the key of the piece, by applying it to the seven natural notes arising from the division of an octave, introducing the semitonic intervals at the proper place in the octave, and repeating the octave above or below, at pleasure. The given note is applied as the principal note or key of the piece, by making frequent closes or cadences upon it; and, in the progress of the melody, no other but those seven natural notes can be admitted, while the piece continues in that key, every other note being foreign to the fundamental, or key.

Now a piece of music may be carried through several keys; i. e. it may be given in one key, and be led out of that into another, by introducing some note foreign to the first, and so on to another: but a regular piece must not only return to the first key, but those other keys, too, must have a particular connection with the first. It may be added, that those other keys must be some of the natural notes of the principal key, though not any of them at pleasure.

As to the distinctions of keys, we have already observed, that to constitute any given note or sound a key, or fundamental note, it must have the seven essential or natural notes added to it; out of which, or their octaves, all the notes of the piece must be taken, while it keeps within the key, i. e. within the government of that fundamental. It is evident, therefore, there are but two different species of keys, which arise according as we join the greater or less third, these being always accompanied with the sixth or seventh of the same species; the third *g*, for instance, with the sixth and seventh *g*; and the third *l*, with the sixth and seventh *l*.

This distinction is expressed under the names of sharp or major key, which is that with the third *g*, &c.; and the flat or minor key, which is that with the third *l*, &c.; whence it is plain, that how many different closes soever there be in a piece, there can be but two keys, if we consider the essential difference of keys; every key being either flat or sharp, and every sharp key being the same, as to melody, as well as every flat one.

It must be observed, however, that in common practice the keys are said to be different, when nothing is considered but the different tune, or pitch of the note, in which the different closes are made. In this sense, the same piece is said to be in different keys, according as it is begun in different notes, or degrees of tune.

Hence arises a farther subdivision of keys into natural and artificial.

A natural key is that in which the distinction of major or minor may be observed, without the addition of either sharp or flat: there are only two natural keys, viz. A the natural flat key, because from A to C is a minor third, A to F a minor sixth, &c.; and C the natural sharp key, because the interval from C to E is

a major third, &c. The semi-tonic intervals in the natural keys always being from B to C and from E to F.

An artificial key is that in which the distinction of minor and major cannot be observed or marked without the addition of sharp or flat.

This is again divided into perfect and imperfect.

A perfect artificial key can preserve its distinction of flat and sharp, and yet lie upon a natural note; as a flat key with B flat and E flat, which key is in G natural.

An imperfect artificial key cannot preserve the distinction of minor or major, without lying upon some flattened or sharpened note: such is a major key with B flat and E flat, which key is in B flat. See Plate 93.

When keys are transposed by the addition of sharps, the first sharp will be applied to the note F a fourth above or a fifth below C the natural sharp key; and this will have the effect of throwing the two semitonic intervals, and consequently transposing the key, a fifth higher, or a fourth lower, to G. The second sharp must be added to the note C a fourth above or a fifth below this new key G; the two sharps together will have the effect of transposing the key another fifth higher, or a fourth lower, that is to say, from G to D; and so on: every new sharp being placed at a fourth higher than the one last added; and thus raising the key a fifth above the latter.

When keys are transposed by means of flats, the first is applied to B the note between A and C the natural flat and sharp keys; and it has the effect of raising the key a fourth, namely the minor key to D, the major to F. The second flat is applied to E the note between the two keys last mentioned; and the two additional flats together transpose the keys to G and B; and so on.

The number of flats and sharps requisite to produce major keys upon all the 12 notes of the chromatic octave, may be ascertained from the table below; and their actual places may be readily determined from the preceding observations and table in pl. 93.

0 sharp	C	0 flat.
7 sharps	C✱ or D♭*	5 flats
2 sharps	D	
9 sharps	D✱ or E♭*	3 flats.
4 sharps	E	
11 sharps	F	1 flat.*
6 sharps	F✱ or G♭*	6 flats.
1 sharp	G	
8 sharps	G✱ or A♭*	4 flats.
3 sharps	A	
10 sharps	A✱ or B♭*	2 flats.
5 sharps	B	
0 sharp	C	0 flat.

In the above the tones usually employed are marked with an asterisk. Thus, it may be easily conceived that by employing D✱ under this form we should have nine sharps which would give two notes with double sharps, viz. F✱✱, C✱✱, so that the gamut would be D✱, E✱ or F, F✱✱ or G, G✱, A✱, B✱ or C, C✱✱ or D, D♮; which, as is manifest, it would be exceedingly difficult to execute: but, by taking E♭ instead of D♮, we have only 3 flats; which renders the gamut much simpler, as it then becomes

E♭, F, G, A♮, B♮, C, D, E♮.

It is almost superfluous to remark, since it will be very obvious from an inspection of the last preceding table, that in every artificial sharp key the number of flats and the number of sharps requisite to make the gamut perfect amount together to twelve, the number of semitones in the chromatic octave. The reason of this it would be easy to shew; but we have not room to dilate upon matters of mere speculation.

Keys also denote those little pieces in the fore-part of an organ, spinette, hapsichord, or piano-forte; by means whereof the jacks are played, so as to strike the strings of the instrument; and wind is given to the pipes, by raising and sinking the sucker of the sound-board. In large organs there are several sets of these keys; some to play the small second organ, some for the main organ, some for the trumpet, and some for the echoing trumpet. In some there are but a part that play, the rest being for ornament. There are twenty slits in large keys, which make the half notes.

M. Buliouski, of Douliez, pretends to have invented a new kind of keys, much preferable to the common ones. With these, he says, he can express sounds, which follow each other in a continual geometrical proportion; and so can furnish all the sounds in music, and by consequence all the imaginary intervals and concords; whereas the common keys do but yield some of them.

KEYAGE. *s.* (from *key.*) Money paid for lying at the key or quay (*Ainsworth*).

KEYHO'LE. *s.* (*key* and *hole.*) The perforation in the door or lock through which the key is put (*Prior*).

KEYNSHAM, a town of Somersetshire, 116 miles from London. It is a great thoroughfare in the lower road between Bath and Bristol. It is called proverbially *smoky* Keynsham, and with equal reason might it be called *foggy*. It has a fine large church, a stone bridge of 15 arches over the Avon to Gloucestershire, and another over the river Chew. Its chief trade is malting. It has a charity school, a weekly market, and three fairs.

KEYSLER (John George), a learned German antiquarian, was born at Thourneau in 1689. After studying at the university of Halle, he was appointed preceptor to Charles Maximilian and Christian Charles, the young counts of Giech Buchau; with whom he travelled through the chief cities of Germany, France, and the Netherlands, gaining great reputation among the learned as he went along, by illustrating several monuments of antiquity, particularly some fragments of Celtic idols lately discovered in the cathedral of Paris. Having acquitted himself of this charge with great honour, he procured, in 1716, the education of two grandsons of Baron Bernstorff, first minister of state to his Britannic majesty as

elector of Brunswick-Lunenburgh. However, obtaining leave in 1718 to visit England, he was elected a fellow of the Royal Society for a learned essay De Dea Nehelennia numine veterum Walachorum topico: he gave also an explanation of the ancient monument on Salisbury plain called Stone-henge, with a Dissertation on the Consecrated Misletoe of the Druids. Which detached essays, with others of the same kind, he published on his return to Hanover, under the title of Antiquitates selectæ Septentrionales et Celticæ, &c. He afterwards made the grand tour with the young barons, and to this tour we owe the publication of his travels; which were translated into English, and published in 1756, in 4 vols. 4to. Mr. Keysler on his return spent the remainder of his life under the patronage of his noble pupils, who committed their fine library and museum to his care, with a handsome income. He died in 1743.

KIA-KING-FOU, a city in China, in the province of Tche-kiang, remarkable for its streets ornamented by beautiful piazzas, that shelter passengers from the sun and rain. Seven cities of the third class are dependent upon it.

KIANG-NAN, a province of China, bounded on the north by Chan-tong, on the east by the sea, on the south by Tche-kiang and Kiang-si, and on the West by Ho-nan, and Hou-quang. Here the ancient emperors always kept their court, till they were obliged for reasons of state to remove nearer Tartary, and choose Peking for the place of their residence. It is of vast extent, and contains fourteen cities of the first order, and ninety-three of the second and third order. These cities are very populous, and of the greatest note in the empire, especially for commerce; it is the rendezvous of all the great barks, for the country is full of lakes, rivers and canals, either natural or the effect of labour, which communicate with the great river Yang-tse-kiang, that crosses the province; here are few mountains, but towards the south. The silks, the japaned goods, the ink, the paper, and in general every thing that comes, as well from Nan-king as from the other cities of the province, which carry on a surprising commerce, is much more esteemed, and bears a greater price, than what is brought from the other provinces: there are many salt-works along the sea coast, and the salt they produce is distributed almost through the empire: here also is found a great quantity of marble. In short, this province is so plentiful and rich, that it pays the emperor annually about 32,000,000 crowns, without reckoning the dues of imports and exports, for the receipt whereof several officers are established. Nan-king is the capital.

KIANG-NANG. See NAN-KING

KIANG-SI, a province of China, bounded on the N. by Kiang-nan, on the W. by Hou-quang, on the S. by Quang-tong, and on the E. by Fo-kien and Tche-kiang. The mountains that lie to the S. are almost inaccessible; but there are fine valleys among them. It is watered by lakes and rivers, and there are mines of gold, silver, lead, iron, and tin. It contains 13 cities of the first rank, and 78 of the second and third. The arrack in this province is excellent; and its porcelain is the finest and most valuable of the empire. Nan-tchang-fou is the capital.

KIANGARI, a town of Turkey in Asia, chief place of a sangiacat, in Natolia. It is defended by a castle, on a rock; and is 256 miles E.S.E. of Constantinople. Lon. 34. 19 E. Lat. 39. 54 N.

KIBES. See CHILBLAINS.

KIBED. *a.* (from *kibe.*) Troubled with kibes.

To KICK. *v. a.* (*kauchen*, Germ.) To strike with the foot (*Swift*).

To KICK. *v. n.* To beat the foot in anger or contempt (*Tillotson*).

KICK. *s.* (from the verb.) A blow with the foot (*Dryden*).

KICK (Cornelius), a flower painter of Amsterdam, born in 1635, and died in 1675. His manner of painting was delicate, and his colouring brilliant, shewing all the freshness of nature.

KI'CKER. *s.* (from *kick.*) One who strikes with his foot.

KI'CKSHAW. *s.* (a corruption of *quelque chose*, something.) 1. Something uncommon or fantastical; something ridiculous (*Milton*). 2. A dish so changed by the cookery that it can scarcely be known (*Fenton*).

KICKSY-WICKSEY. *s.* (from *kick* and *wince.*) A made word in ridicule and disdain of a wife (*Shakspeare*).

KID. *s.* (*kid*, Danish.) 1. The young of a goat (*Spenser*). 2. (from *cidwlen*, Welsh, a faggot.) A bundle of heath or furze.

To KID. *v. a.* (from the noun.) To bring forth kids.

KI'DDER. *s.* An engrosser of corn to enhance its price (*Ainsworth*).

KIDDER (Richard), a learned English prelate, was born in Suffolk, and educated at Emanuel college, Cambridge, by which society he was preferred to a living in Huntingdonshire, from whence he was ejected for nonconformity in 1662, but afterwards he thought proper to comply, and obtained the rectory of Raine in Essex. In 1674 he was presented to the living of St. Martin, Outwich, London; and in 1689 was made dean of Peterborough. On the deprivation of Dr. Ken, bishop of Bath and Wells, he was promoted to that see, which he held to his death in 1713. This circumstance was occasioned by a stack of chimneys falling during a great storm, and which killed him and his lady in bed. He is well known as the writer of a most elaborate work, entituled, A Demonstration of the Messias, in 1 vol. folio and 3 in 8vo.

KIDDERMINSTER, a corporate town in Worcestershire, with a market on Thursday. It is seated under a hill, on the river Stour, and is the principal manufacturing place in the county. Its former trade of stuffs is much declined, on account of the general use of cot-

ton goods; but its carpet manufactory has greatly increased. It is the first market in England for pile or plush carpets, which, for beauty of colour and patterns, exceed any other. These are frequently called Wilton, from having been first made at that town. The worsted shag trade has also been introduced here, and employs many looms. It is 14 miles S.E. of Bridgenorth, and 125 N.W. of London. Lon. 2. 18 W. Lat. 52. 28 N.

KIDDLE, or Kidel, (*kidellus*), a dam or weir in a river with a narrow cut in it, for the laying of pots or other engines to catch fish. The word is ancient; for in Magna Charta, cap. 24. we read, "Omnes kidelli deponantur per Thamesiam & Medweyam, & per totam Angliam, nisi per costeram maris." And by king John's charter, power was granted to the city of London, "de kidellis amovendis per Thamesiam & Medweyam." A survey was ordered to be made of the weirs, mills, stanks, and kidells, in the great rivers of England, 1 Hen. IV. Fishermen of late corruptly call these dams *kettles*; and they are much used in Wales and on the sea-coasts of Kent.

To KIDNA'P. *v. a.* (from *kind*, Dutch, a child, and *nap*.) To steal children; to steal human beings.

KIDNA'PPER. *s.* (from *kidnap*.) One who steals human beings.

KIDNAPPING, is the forcible taking and carrying away a man, woman, or child, from their own country, and sending them to another. This is an offence at common law, and punishable by fine, imprisonment, and pillory.

By stat. 11 and 12 W. III. c. 7, if any captain of a merchant vessel shall during his being abroad force any persons on shore, and wilfully leave them behind, or refuse to bring home all such men as he carried out, if able and desirous to return, he shall suffer three months imprisonment. Exclusive of the above punishment for this as a criminal offence, the party may recover upon an action for compensation in damages for the civil injury.

KIDNEY. See Kidneys.

Kidney, in ludicrous or familiar language, signifies sort, or kind, as, "He is of the right kidney."

Kidney-bean, in botany. See Phaseolus.

Kidney-bean (Carolina). See Glycine.

Kidney-bean tree. See Glycine.

Kidney vetch. See Anthyllis.

Kidney-wort. See Saxifraga.

Kidney-shaped leaf. In botany, folium reniforme. Roundish and hollowed at the base without angles. Applied also to the anther and seed, which being solid bodies, have really the form of a kidney; whereas a leaf, being a plane surface, resembles the section of a kidney. This distinction is to be observed in several other cases.

Kidneys. Renes. Two abdominal viscera, shaped like a kidney-bean, that secrete the urine. They are situated on each lumbar region, near the first lumbar vertebra, behind the peritoneum, and are composed of three substances; a cortical, which is the external, and very vascular; a tubulose, which consists of small tubes; and a papillous substance, which is the innermost. The kidneys are generally surrounded with more or less adipose membrane, and have also a proper membrane, membrana propria, which is closely accreted to the cortical substance. The renal arteries, called also emulgents, proceed from the aorta. The veins evacuate their blood into the ascending cava. The absorbents accompany the blood-vessels, and terminate in the thoracic duct. The nerves of the kidneys are branches of the eighth pair and great intercostals. The excretory duct of this viscus is called the ureter. It commences at the middle or pelvis of the kidney, where the blood-vessels enter it, and is at first a large membranous bag, which diminishes like a funnel, till it becomes a long narrow canal. The ureters convey the urine from the kidney to the bladder, which it perforates obliquely.

KIDWELLY, a town of Carmarthenshire. in S. Wales, with a market on Tuesday. It is seated on a creek of the Bristol Channel, near the mouth of the Towy. From this town a canal has been cut to some collieries, whence coal is brought down and exported. It is eight miles S. of Carmarthen, and 224 W. by N. of London. Lon. 13. 15 W. Lat 54. 44 N.

KIEL, a strong, rich, and considerable town of Germany, capital of the duchy of Holstein, with a castle, and a university. It stands upon a small peninsula in a bay of the Baltic, and has a very commodious harbour for ships of the largest size. Lon. 10. 0 E. Lat. 54. 20 N.

KIERINGS (Alexander), a landscape painter of Utrecht, born in 1590, and died in 1646. His views were copied from nature, and he finished them with amazing patience, even the bark and the fibres of the trees being distinctly marked.

KIFFEKIL, in oryctology. This mineral is dug up near Conie in Natolia, and is employed in forming the bowls of Turkish tobacco-pipes. The sale of it supports a monastery of dervises established near the place where it is dug. It is found in a large fissure six feet wide, in grey calcareous earth. The workmen assert that it grows again in the fissure, and puffs itself up like froth. This mineral, when fresh dug, is of the consistence of wax; its feels soft and greasy; its colour is yellow; its specific gravity 1.600: when thrown on the fire it sweats, emits a fetid vapour, becomes hard, and perfectly white.

According to the analysis of Klaproth, it is composed of

50.50	silica
17.25	magnesia
25.00	water
5.00	carbonic acid
.50	lime.
98.25	

KIGGELARIA. In botany, a genus of the class diœcia, order dodecandria. Calyx

five-parted; petals five; with five three-lobed glands. Male: anthers perforated at the top. Fem.: Styles five; capsule one-celled, five-valved, many seeded. One species, a Cape tree with a grey bark; leaves lanceolate, serrate, glabrous; seeds immersed in the pulp. It is reared in our own hot-houses, and is propagated by seeds, cuttings, or layers.

KIGHLEY, a town in the west riding of Yorkshire, six miles to the south-east of Skipton in Craven. It stands in a valley surrounded with hills, at the meeting of two brooks, which fall into the river Are one mile below it. Every family is supplied with water brought to or near their doors in stone troughs from a never-failing spring on the west side of it. The parish is six miles long and two broad, and is 60 miles from the east and west seas; yet at the west end of it near Camel-Cross is a rising ground, from which the springs on the east side of it run to the east sea, and those on the west to the west sea. By the late inland navigation, this town has a communication with the rivers Mersey, Dee, Ribble, Ouse, Trent, Derwent, Severn, Humber, Thames, &c. which navigation, including its windings, extends above 500 miles, in the counties of Lincoln, Nottingham, Lancaster, Westmoreland, Chester, Stafford, Warwick, Leicester, Oxford, Worcester, &c.

KIKEKUNE'MALO. A pure resin, very similar to copal, but of a more beautiful whiteness and transparency. It is brought from America, where it is said to be used medicinally in the cure of hysteria, tetanus, &c. It forms the most beautiful of all varnishes.

KILBEGGAN, a post, fair, and borough-town of Ireland, in the county of Westmeath and province of Leinster, 44 miles from Dublin. Previously to the union it returned two members to parliament. It is seated on the river Brosna, over which there is a bridge. There was here a monastery founded in 1200, and dedicated to the Virgin Mary, and inhabited by monks from the Cistertian abbey of Melefont. The fairs are two.

KILDA (St.), a small island of Scotland, one of the Hebrides, 18 leagues to the W. of N. Uist. A great number of the poor people in this island live chiefly by fishing and catching wild fowls. In the latter employment, they are incredibly adventurous; being often let down by a rope from the summit of high precipitous rocks, where they clamber among the rugged cliffs, in search of the eggs and nests of various birds. But the more safe and common method of catching these fowls is, by spreading a large net over the face of the rock where they lodge, in which great numbers are at once entangled, and lowered down into a boat. St. Kilda is the most westerly island of Great Britain.

KILDERKIN. (from *kindekin*, a baby, Dutch.) A kind of liquid measure, containing two firkins, or 18 gallons, beer-measure, or 16 ale-measure.

KILGARREN, a town in Pembrokeshire, with a market on Wednesday. It had formerly a castle, now in ruins; and near it is a remarkable salmon-leap, where that fish is caught in great abundance. Above this place, are large works for fabricating tin plates. It is seated on the Tyvy, 30 miles N. of Pembroke, and 227 W.N.W. of London. Lon. 4. 40 W. Lat. 54. 4 N.

KILHAM, a town in the E. riding of Yorkshire, with a market on Saturday, 36 miles N.E. of York, and 200 N. of London. Lon. 0. 16 W. Lat. 54. 5 N.

KILIA, a fortified town of Turkey in Europe, in Bessarabia; seated on an island, at the mouth of the Danube. It was taken by the Russians in 1790, but restored at the subsequent peace. It is 86 miles S.W. of Bialogorod, and 290 N.E. of Constantinople. Lon. 28. 46. E. Lat. 45. 22 N.

KILKENNY, a county of Ireland, bounded on the north by Queen's county, on the east by Carlow and Wexford, on the south by Waterford, and on the west by Tipperary; about thirty-five miles from north to south, and nineteen from east to west. It contains 127 parishes, about 17,570 houses, and upwards of 95,000 inhabitants: the surface is generally level, and the soil fertile in corn, equal to most other parts of Ireland. The principal rivers are the Barrow, which bounds it on the east, the Suir, which forms its southern boundary, and divides it from Waterford, and the Nore, which crosses it from north to south. Sixteen members were sent to the Irish parliament by this county, the city of Kilkenny, and the boroughs of St. Canice, Gowran, Knocktopher, Thomastown, Innistioghe, and Callen.

KILKENNY, a city of Ireland, and capital of the county to which it gives name; situated on the river Nore, over which are two handsome bridges: the borough of St. Canice or Irish Town is joined to it, and both together form one large town. It is the see of a bishop, founded in the fifth century. The cathedral is small; the houses are decorated with a beautiful black and white marble, dug from quarries near the town: considerable manufactures of blankets and coarse woollen cloths are carried on here. The number of inhabitants is about 16,000: sixty-five miles N.E. Cork, and fifty-six S.S.W. Dublin. Lon. 7. 15 W. Lat. 52. 38 N.

KILKENNY COAL, in mineralogy. See BITUMEN.

To KILL. *v. a.* (anciently *to quell*; cpellan, Saxon; *kelen*, Dutch.) 1. To deprive of life; to put to death, as an agent (*Mac.*). 2. To destroy animals for food (*Shaksp.*). 3. To deprive of life as a cause or instrument (*Bac.*). 4. To deprive of vegetative or other motion, or active qualities (*Floyer*).

KILLALA, a town of Ireland, in the county of Mayo, the see of a bishop, founded about the middle of the fifth century, and united with Achonry, situated on a fine bay of the Atlantic to which it gives name. This bay is near six miles from east to west, and five from north to south. Killala is not a town of consequence: twenty-three miles N. Castlebar,

and twenty-six W. Sligo. Lon. 9. 3 W. Lat. 54. 12 N.

KILLALOE, a town of Ireland, in the county of Clare, the see of a bishop, founded in the fifth century. In the twelfth century it was united with the bishopric of Roscrean, and in the year 1752, the bishopric of Killfenora was annexed to it. It is situated on the Shannon, by which it is separated from the county of Tipperary, with a bridge of communication: twenty miles E. Ennis, and eleven N.N.E Limerick.

KILLARD POINT, a cape of Ireland, on the east coast of the county of Down, in the English Channel, six miles E. from Downpatrick. Lon. 5. 27 W. Greenwich. Lat. 54. 22 N.

KILLARNEY, a town of Ireland, in the county of Kerry: thirty-six miles W. Cork, and fifty S.W. Limerick. Lon. 9. 27 W. Lat. 51. 2 N.

Near Killarney is a large and beautiful lake, called the Lake of Killarney, or Lough Lean, 12 or 14 miles long, and in many places four miles broad. The views in sailing over, or coasting along this lake, are very picturesque, and often sublime; and the variety furnished by the numerous little islands on the lake adds greatly to the general effect.

KILLAS, in mineralogy. See ARDESIA.

KI'LLER. *s.* (from *kill.*) One that deprives of life (*Sidney. Waller*).

KILLICRANKIE, a noted pass in Perthshire, near the junction of the Tumel with the Garry. It is the grand entrance into the Highlands in those parts, and is formed by the lofty mountains impending over the Garry, which rushes through in a deep and rocky channel, overhung with trees. In the last century, this was a pass of much difficulty and danger: a path hanging over a tremendous precipice threatened destruction to the least false step of the traveller. At present, a fine road gives an easy access to the remote Highlands; and the two sides are joined by a fine arch. Near the north end of this pass, in its open and unimproved state, king William's army, under general Mackey, was defeated, in 1689, by the Highlanders, commanded by viscount Dundee, who was killed in the moment of victory.

KILLIGREW (William), eldest son of Sir Robert Killigrew, knight, was born in 1605. He was gentleman-usher of the privy-chamber to king Charles I. and on the Restoration to Charles II. When the latter married the princess Catherine of Portugal, he was created vice-chamberlain; in which station he continued 22 years, and died in 1693. He was the author of four plays, which, though now thrown aside, were much applauded by the poets of that time, particularly by Mr. Waller; and in the decline of life he published some pious reflections on the instability of human happiness when our views are not directed to a future state.

KILLIGREW (Thomas), brother of the former, was born in 1611, and in process of time distinguished himself by his uncommon natural parts. He was page of honour to king Charles I. and groom of the bed-chamber to Charles II. with whom he suffered many years exile; during which he applied his leisure hours to the study of poetry, and to the composition of several plays. After the Restoration he continued in high favour with the king, and had frequently access to him when he was denied to the first peers in the realm; and being a man of great wit and liveliness of parts, and having from his long intimacy with that monarch, and being continually about his person during his troubles, acquired a freedom and familiarity with him which even the pomp of majesty afterwards could not check in him, he sometimes, by way of jest, which king Charles was ever fond of, if genuine, even though himself was the object of the satire, would adventure bold truths which scarcely any one besides would have dared even to hint at. One story in particular is related of him, which, if true, is a strong proof of the great lengths he would sometimes proceed in freedoms of this kind, and is as follows:—When the king's unbounded passion for women had given his mistress such an ascendant over him, that, like the effeminate Persian monarch, he was much fitter to have handled a distaff than to wield a sceptre, and for the conversation of his concubines utterly neglected the most important affairs of state; Mr. Killigrew went to pay his majesty a visit in his private apartments, habited like a pilgrim who was bent on a long journey. The king, surprised at the oddity of his appearance, immediately asked him what was the meaning of it, and whither he was going? "To hell," bluntly replied the wag. "Pr'ythee (said the king), what can your errand be to that place?" "To fetch back Oliver Cromwell (rejoined he), that he may take some care of the affairs of England; for his successor takes none at all." Killigrew died in 1682.

KILLIGREW (Anne), "a Grace for beauty, and a Muse for wit," as Mr. Wood says, was the daughter of Dr. Henry Killigrew, brother of the two foregoing, and was born a little before the Restoration. She gave early indications of genius, and became eminent in the arts both of poetry and painting. She drew the duke of York and his duchess, to whom she was maid of honour, as well as several other portraits and history-pieces; and crowned all her other accomplishments with unblemished virtue and exemplary piety. Mr. Dryden seems quite lavish in her praise, though Wood assures us he has said no more of her than she was equal if not superior to. This amiable young woman died of the small-pox in 1685; and the year after her poems were published in a thin 4to volume.

KILLILEAGH, a borough of Ireland, in the county of Down, seated on an arm of Strangford Lough, where ships may be sheltered from all winds. It suffered much in the war of 1641; but it is now a thriving place, with a linen and thread manufactory. Here

is a castle, formerly the seat of the family of Hamilton, now earls of Clanbrassil; and the celebrated sir Hans Sloane was born in this town. It is 80 miles N. by E. of Dublin. Lon. 5. 32 W. Lat. 54. 23 N.

KILLINHAULE, a town of Ireland, in the county of Tipperary, 14 miles N. of Clonmell. Lon. 7. 26 W. Lat. 52. 27 N.

KILLONY, a town of Ireland, in the county of Sligo, six miles S. of Sligo. Lon. 8. 25 W. Lat. 54. 11. N.

KILLOUGH, or PORT ST. ANN, a seaport of Ireland, in the county of Down, situate on the N. of St. John's Point, in the Irish Sea. A rock stands in the middle of the entrance of its harbour, covered at half flood. Here is a manufacture of salt. It is 76 miles N. by E. of Dublin.

KILLYBEGS, a borough of Ireland, in the county of Donegal, with a spacious harbour on the N. side of Donegal Bay. It is 12 miles N.W. of Ballyshannon. Lon. 8. 6 W. Lat. 54. 40 N.

KILMAC-THOMAS, a town of Ireland, in the county of Waterford, 12 miles S.E. of Waterford. Lon. 7. 10 W. Lat. 52. 14 N.

KILMAINHAM, a town of Ireland, about half a mile from Dublin. It has a session-house and a gaol; and here the quarter sessions are held for the county of Dublin, and the knights for the shire elected. It was sometimes the seat of government, before the castle at Dublin was appropriated to that purpose.

KILMALLOCK, a borough of Ireland, in the county of Limerick, 18 miles S. of Limerick. Lon. 8. 34 W. Lat. 52. 24 N.

KILMARNOCK, a populous town in Ayrshire, noted for its manufacture of gloves, carpets, stockings, nightcaps, bonnets and other woollen goods. It is 15 miles S.W. of Glasgow.

KILMORE, a town of Ireland, in the county of Cavan, with a bishop's see, three miles S.W. of Cavan. Lon 7. 11 W. Lat. 54. 2 N.

KILN. *s.* (cyln, Saxon.) A stove; a fabric formed for admitting heat, in order to dry or burn things contained in it (*Bacon*).

Brigadier General Dirom of Mount Annan, in Scotland, built some lime-kilns in 1801; of which he published an account in the third volume of the Transactions of the Highland Society.

"These kilns were constructed with a view to save fuel, to calcine the stone equally, and to give the burner the command of the heat." To accomplish these objects the two kilns were built circular, and adjoining each other, but instead of being open at the top, as the common lime-kiln is, they were covered with an arched dome, a door being left on one side at the springing of the arch, to put in the charge, and a chimney being carried out on the opposite side at the same height to convey away the smoke. The walls were built in the usual manner with stone work and were lined with brick, an interval of about four inches being left between, which was filled with rubble and small stones without mortar; this was done to form a non-conductor of heat by admitting a circulation of air, in order to prevent the kiln from bursting by the expansion caused by the heat; and the whole was bound with frames of wood strongly fastened together at the distance of about six feet from the ground, and the same interval from each other. The charging doors were made circular and were shut by a frame of iron filled with fire-bricks, and hung on a hinge or bolt; the grate at the bottom was made with the four middle bars to draw out, the better to let down the calcined stone or lime-shells, when the kiln was choaked or did not draw freely: a damper was also put in the flue of the chimney to regulate the draught, and within the dome a flue was carried from each side of the charging door to the commencement of the chimney, to intercept the ascent of the smoke in some degree when the door was opened for charging. These kilns were not intended to be wrought by drawing and filling at the same time, as is done in common kilns; for then the advantage would be lost which arises from confining the heat in calcining the stone; but it was intended that one should be filled and kept shut, while the other was drawing, and so they were to be filled and drawn alternately.

It appeared to General Dirom that the current of air being regulated by means of the door below and the damper above, the burner may admit of such a column, as might enable him to work the kiln as quickly as may be done, without waste of fuel and without melting or vitrifying the stone; or he may lengthen the process by lessening the draught of air through the kiln. As the expense of the kilns here described was about 300l. it is very justly observed that they can be recommended only where the demand for lime is considerable, and the saving of fuel an object of importance; the saving of this article not being more, if so much, as one third of what would be necessary in open kilns.

These kilns, however, are constructed on correct mechanical and chemical principles, and f the effect fell short of the general's just expectations the cause ought rather to be attributed to the ill-management of the persons employed, than to any defect in the kilns themselves. The value of lime calcined with a very great degree of heat is well known to all persons concerned in masonry, and every improvement of kilns, which increases the heat during calcination, may be considered an important discovery. It is to be feared that the great expense of building lime-kilns in the mode proposed will preclude the general adoption of the plan.

To KI'LNDRY. *v. n.* (*kiln* and *dry*.) To dry by means of a kiln (*Mortimer*).

KILT, for *killed* (*Spenser*).

KI'MBO. *a.* (*a schembo*, Italian.) Crooked; bent; arched (*Arbuthnot*).

KIMBOLTON a town in Huntingdonshire, with a market on Friday. The castle

(the seat of the duke of Manchester) has been much improved. Queen Catherine after her divorce from Henry VIII. resided some time in this castle. It is eight miles N.W. of St. Neot's, and 64 N. by W. of London. Lon. 0. 18 W. Lat. 52. 15 N.

KIMI, a town of Sweden, capital of a province of the same name, in E. Bothnia, at the mouth of the Kimi, which here falls into the gulf of Bothnia, 10 miles S.E. of Tornea.

KIMPOLUNG, a town of Turkey in Europe, in Moldavia, on the river Moldavia, 92 miles N. E. of Coloswar.

KIN, a town of Persia, in the province of Segestan, situate at the foot of a chain of mountains, near the lake Zare, 320 miles E. of Ispahan.

KIN. *s.* (cynne, Saxon.) 1. Relation either of consanguinity or affinity (*Bacon*). 2. Relatives; those who are of the same race (*Dryden*). 3. A relation; one related (*Davies*). 4. The same generical class (*Boyle*). 5. A diminutive termination from *kind*, a child, Dutch: as, *manikin*, *minikin*, *wilkin*.

KINA KINA. See CINCHONA.

KINBURN, a fortress of the Russian empire, at the mouth of the Dneiper, opposite Oczakow. In the last war with Russia, the Turks made several attacks upon it by land and sea, but were finally repulsed.

KINCARDINE-O-NIEL, a village in Aberdeenshire, seated on the river Dee, 23 miles W. of Aberdeen.

KINCARDINESHIRE, or MEARNS, a county of Scotland, bounded on the N. and N.W. by Aberdeenshire, on the E. by the German Ocean, and on the S.W. by Angusshire. Its length along the coast is 30 miles; its greatest breadth 20. The only borough in it is Inverbervie.

KIND. *a.* (from cynne, relation, Saxon.) 1. Benevolent; filled with general good-will (*South*). 2. Favourable; beneficent (*Luke*).

KIND. *s.* (cynne, Saxon.) 1. Race; generical class (*Hooker*). 2. Particular nature (*Baker*). 3. Natural state (*Arbuthnot*). 4. Nature; natural determination (*Shakspeare*). 5. Manner; way (*Bacon*). 6. Sort (*Bac.*).

To KI'NDLE. *v. a.* (*cinnu*, Welsh; cyndelan, Saxon.) 1. To set on fire; to light; to make to burn (*King Charles*). 2. To inflame the passions; to exasperate; to animate; to fire the mind (*Daniel*).

To KI'NDLE. *v. n.* 1. To catch fire (*Isa.*). 2. (from cennan, Saxon.) To bring forth.

KI'NDLER. *s.* (from *kindle.*) One that lights; one who inflames (*Gay*).

KI'NDLY. *ad.* (from *kind.*) Benevolently; favourably; with good-will (*Shakspeare*).

KI'NDLY. *a.* (from *kind.*) 1. Homogeneal; congenial; kindred; of the same nature (*Hammond*). 2. Bland; mild; softening (*Dryden*).

KI'NDNESS. *s.* (from *kind.*) Benevolence; beneficence; good-will; favour (*Collier*).

KI'NDRED. *s.* (cynrene, Saxon.) 1. Relation by birth or marriage; cognation; consanguinity; affinity (*Dryden*). 2. Relation; suit (*Shakspeare*). 3. Relatives (*Denham*).

KI'NDRED. *a.* Congenial; related; cognate (*Dryden*).

KINE. *s.* plur. from *cow*.

KINETON, a town in Warwickshire, with a market on Tuesday. King John kept his court in a castle here. It is 10 miles S.S.E. of Warwick, and 88 N.W. of London. Lon. 1. 24 W. Lat 52. 11 N.

KING, a monarch or potentate who rules singly and sovereignly over a people. Camden derives the word from the Saxon *cyning*, which signifies the same: and that from *can* power, or *ken* knowledge, wherewith every monarch is supposed to be invested. The Latin *rex*, the Scythian *reix*, the Punic *resch*, the Spanish *rey*, and the French *roy*, come all, according to Postel, from the Hebrew ראש *rasch*, chief, head.

Kings were not known amongst the Israelites till the reign of Saul. Before him they were governed at first by elders as in Egypt; then by princes of God's appointment, as Moses and Joshua; then by judges till the time of Samuel; and last of all by kings, as we read in scripture.

Most of the Grecian states were governed at first by kings, who were chosen by the people to decide differences and execute a power which was limited by laws. They commanded armies, presided over the worship of the gods, &c. This royalty was generally hereditary; but if the vices of the heir to the crown were odious to the people, or if the oracle had so commanded, he was cut off from the right of succession; yet the kings were supposed to hold their sovereignty by the appointment of Jupiter. The ensign of majesty was the sceptre, which was made of wood adorned with studs of gold, and ornamented at the top with some figure; commonly that of an eagle, as being the bird of Jove.

Rome also was governed at first by kings who were elected by the people, with the approbation of the senate and concurrence of the augurs. Their power extended to religion, the revenues, the army, and the administration of justice. The monarchical form of government subsisted 244 years in Rome, under seven kings, the last of whom was Tarquinius Superbus.

Lawyers say, the king of England, or of the British empire, is a mixed person, a priest as well as a prince: at his coronation he is anointed with oil, as the priests and kings of Israel were, to intimate, that his person is sacred.

Among the Greeks, the king of Persia had anciently the appellation of the great king; the king of France had that of the most Christian king, and the king of Spain that of catholic king. See CATHOLIC.

The king of the Romans is a prince chosen by the emperor, as a coadjutor in the government of the empire.

The kings of England, by the Lateran coun-

cil under pope Julius II. had the title of Christianissimus conferred on them; and that of defender of the faith was added by pope Leo X. though it had been used by them some time before.

The title of grace was first given to our kings about the time of Henry IV. and that of majesty first to Henry VIII. before which time our kings were called grace, highness, &c.

In all public instruments and letters, the king styles himself *nos*, we; though till the time of king John, he spoke in the singular number.

The Hungarians formerly gave the name king to their queen Mary, to avoid the infamy which the laws of that country cast upon those who are governed by women: accordingly, she bore the title of king Mary, till her marriage with Sigismund, at which time she took the title of queen.

The laws make it high treason barely to imagine or intend the death of the king; and, because the destruction of the king may ensue that of his great counsellors or officers, it is felony in any of the king's servants to conspire even that; though in other capital cases, it is a rule, that *voluntas non reputabitur pro facto*; and an Englishman shall not, in any other case, be put to death, unless the deed follow the intent. The king's office (as he promises at his coronation) is to preserve the rights and privileges of the church, the prerogative of the crown, the laws and customs of the realm, &c. or, as Fortescue has it, he is *pugnare bella populi sui, & eos rectissime judicare.*

The king is considered by the laws of England as the head and supreme governor of the national church. 26 Hen. VIII. cap. 1. 1 Eliz. cap. 1. In virtue of this authority, he convenes, prorogues, restrains, regulates, and dissolves, all ecclesiastical synods or convocations.

He has the supreme right of patronage, called patronage paramount, over all the ecclesiastical benefices in England. He has power, by his prerogative, without any act of parliament, to make war or peace, conclude leagues and treaties, grant safe-conducts, give commissions for raising and regulating fleets and armies, as well as for erecting, manning, and governing forts, and other places of strength, to appoint ports and havens, to erect beacons, light-houses, and sea-marks, to prohibit the exportation of arms or ammunition out of the kingdom, dispose of magazines, castles, ships, public moneys, &c. He has the sole power of sending ambassadors to foreign states, and of receiving ambassadors at home. He convokes, adjourns, prorogues, and dissolves parliaments; and may refuse his assent to any bill passed by both houses, without giving his reasons for it.

He may increase the number of members of either house at pleasure, by creating new peers, and bestowing privileges on other towns for sending burgesses to parliament. But this part of the prerogative of increasing the number of parliament-men, in the lower house, seems to be given up by the late kings, while the number of peers has been considerably increased by them. The king is entrusted with the sole power of conferring dignities and honours, so that all degrees of nobility, knighthood, and other titles, are received by immediate grant from the crown; either expressed in writing, by writs or letters patent, as in the creation of peers and baronets; or by corporeal investure, as in the creation of a simple knight. And as the king may create new titles, so he may create new offices, but with this restriction, that he cannot create new offices with new fees annexed to them, nor annex new fees to old offices; for this would be a tax upon the subject, which cannot be imposed but by act of parliament. The king has also the prerogative of conferring privileges upon private persons; such as granting place or precedence to any of his subjects; such is also the power to enfranchise an alien, and make him a denizen. Such is likewise the prerogative of erecting corporations.

The king is also the arbiter of commerce. Under this branch of the prerogative he has power to establish public marts, or places of buying and selling; such as markets and fairs, with the tolls belonging to them; and likewise to regulate weights and measures; to give money, which is the medium of commerce, authority, or to make it current; and the coining of money is the act of the sovereign power, and the settling of the denomination or value for which the coin is to pass current. The king may also at any time decry or cry down any coin of the kingdom, and make it no longer current.

Debts due to him are always to be satisfied in the first place, in case of executorship, &c. and till his debt is discharged, he may protect the creditor from the arrests of others. He may distrain for the whole debt on a tenant that holds but part of the land; is not obliged to demand his rent as others are; may sue in what court he pleases, and distrain where he lists. In all doubtful cases, *semper præsumitur pro rege*: no statute restrains him, unless he be particularly named. In all cases where the king is plaintiff, his officers may enter with an arrest; and, if entrance be denied, break open a house, and seize the party; though in other cases a man's house is his castle, and has a privilege to protect him against all arrests.

He has custody of the persons and estates of idiots and lunatics; he is *ultimus hœres regni*, and to him revert all estates, when no heir appears. All treasure-trove (i. e. money, plate, or bullion, found, and the owners not known) belongs to him; so all waifs, strays, wrecks, lands recovered from the sea, gold and silver mines, royal fishes, &c. belong to him. See REVENUE. He can unite, separate, enlarge, or contract, the limits of bishoprics, or ecclesiastical benefices, and by his letters erect new bishoprics, colleges, &c. See REGALIA.

He can dispense with the rigour of the ecclesiastical laws, except those which have been confirmed by an act of parliament, or declared

by the bill of rights; as, for a bastard to be a priest, for a bishop to hold a benefice in commendam, &c. He has also power to dispense with several acts of parliament, and penal statutes, by a non-obstante, where himself is alone concerned; to moderate the rigour of the law, according to equity; to pardon a man condemned by law, except in appeals of murder, and in case of impeachments by the house of commons; and to interpret by his judges, in statutes and cases not defined by law.

But though he be intrusted with the whole executive power of the law, yet he cannot sit in judgment in any court; for justice must be administered according to the powers committed and distributed to the several courts.

The law esteems him God's vicegerent on earth, and ascribes various perfections to him, not belonging to any other man. "Rex est vicarius," says Bracton, "et minister Dei in terra. Omnis quidem sub eo est, et ipse sub nullo, nisi tantem sub Deo." He is said to have imperial dignity; and in charters before the Conquest is frequently styled *basileus*, and *imperator*, the titles respectively assumed by the emperors of the East and West. His realm is declared to be an empire, and his crown imperial, by many acts of parliament, particularly the statutes 24 Hen. VIII. cap. 12. and 25 Hen. VIII. cap. 28. which at the same time declare the king to be the supreme head of the realm in matters both civil and ecclesiastical, and consequently inferior to no man upon earth, dependent on no man, and accountable to no man. See also 24 Geo. II. cap. 24. 5 Geo. III. cap. 27. Hence it is that no suit or action can be brought against the king, even in civil matters; because no court can have jurisdiction over him. The law also ascribes to the king, in his political capacity, absolute perfection. The king can do no wrong; by which ancient and fundamental maxim we are not to understand, that every transaction of government is of course just and lawful, but that whatever is exceptionable in the conduct of public affairs is not to be imputed to the king, nor is he answerable for it personally to his people; and farther, that the prerogative of the crown extends not to do any injury; it is created for the benefit of the people, and therefore cannot be exerted to their prejudice. In the king there is no folly or weakness; no injustice or error; and, therefore, if the crown should be induced to make an improper grant of any franchise or privilege, the law declares that the king was deceived in his grant, and thereupon such grant is rendered void, merely upon the foundation of fraud and deception, either by or upon those agents whom the crown has employed. Yet, notwithstanding this personal perfection which the law ascribes to the sovereign, the constitution has allowed a latitude of supposing the contrary, in respect to both houses of parliament; each of which, in its turn, hath exerted the right of remonstrating and complaining to the king even of those acts of royalty, which are most properly his own; such as messages signed by himself, and speeches delivered from the throne; nevertheless, for the sake of freedom of debate, these acts of state are usually supposed to proceed from the advice of the administration. In the king likewise there can be no negligence or *laches*, and, therefore, no delay will bar his right: *nullum tempus occurrit regi*. In the king also there can be no infamy, stain, or corruption of blood.

By his crown he is, *ipso facto*, cleared of all attainder; no non-age or minority are allowed in him; and his very grants of lands, though held in his natural capacity, cannot be avoided by non-age. Nay more, the law ascribes a kind of perpetuity, or immortality, to him: *rex Angliæ non moritur*. His death is termed his *demise*, because the crown is thereby demised to another.

He is said not to be liable to death, as being a corporation of himself, that lives for ever. There is no interregnum, but the moment one king dies, his heir is king, fully and absolutely, without any coronation, ceremony, &c. If, however, the throne becomes empty or vacant, whether by abdication, as in the time of James II., or by failure of all heirs, the two houses of parliament may, it is said by Blackstone, dispose of it.

The preamble to the bill of rights expressly declares, that the lords spiritual and temporal, and commons, assembled at Westminster, lawfully, fully, and freely represent all the estates of the people of this realm. The lords are not less the trustees and guardians of their country than the members of the House of Commons. It was justly said, when the royal prerogatives were suspended, during his Majesty's illness in 1788, that the two houses of Parliament were the organs by which the people expressed their will: and in the House of Commons, on the 16th of December, in that year, two declaratory resolutions were accordingly passed, importing, 1. The interruption of the royal authority; 2. That it was the duty of the two Houses of Parliament to provide the means of supplying that defect. On the 23d of the same month a third resolution passed, empowering the Lord Chancellor of Great Britain to affix the great seal to such bill of limitations as might be necessary to restrict the power of the future regent to be named by Parliament. This bill was accordingly brought forward, not without considerable opposition to its provisions, as well from private motives, as on forcible political grounds; and at length, happily for the public, arrested in its progress, by the providential recovery of his Majesty, in March 1789. It is observable, however, that no bill was ever afterwards introduced to guard against a future emergency of a similar nature: on the grounds, undoubtedly, of delicacy to a monarch universally beloved; in the hope of the improbability that such a circumstance should recur in future; and in the confidence of the omnipotence of Parliament, if necessarily called upon again.

The law attributes a kind of ubiquity to the king; he is in a manner every where, in all

courts of judicature, which he alone has the right of erecting, and therefore cannot be nonsuited. The power of issuing proclamations is vested in the king alone, considered as the fountain of justice.

Some things, however, there are which the king cannot do; viz. he cannot divest himself, or successors, of any part of his regal prerogative, authority, &c. There are several things also which he cannot do *salvo jure, salvo juramento, et salva conscientia sua:* in particular, there are two things which he cannot do without the consent of parliament; viz. make new laws, or raise new taxes.

The coronation oath is conceived in the following terms:

The archbishop or bishop shall say, Will you solemnly promise and swear to govern the people of this kingdom of England, (*quere* Great Britain. See statute 5 Ann. c. 8, sect. 1. and this dictionary, title Scotland;) and the dominions thereto belonging, according to the statutes in parliament agreed on; and the laws and customs of the same? The king or queen shall say, I solemnly promise so to do. Archbishop or bishop, Will you to your power cause law and justice, in mercy, to be executed in all your judgments? King or queen, I will. Archbishop or bishop, Will you to the utmost of your power maintain the laws of God, the true profession of the gospel, and the protestant reformed religion established by the law? and will you preserve unto the bishops and the clergy of this realm, and to the churches committed to their charge, all such rights and privileges as by law do or shall appertain unto them or any of them? King or queen, All this I promise to do. After this the king or queen, laying his or her hand upon the Holy Gospels, shall say, The things which I have here before promised I will perform and keep, so help me God. And then shall kiss the book. It is also required, both by the Bill of Rights, 1 William and Mary, statute 2, c. 2, and the act of settlement, 12 and 13 William III. c. 2, that every king and queen, of the age of twelve years, either at their coronation, or on the first day of the first parliament, upon the throne in the House of Peers (which shall first happen) shall repeat and subscribe the declaration against Popery, according to 30 Charles II. statute 2, c. 1.

The above is the form of the coronation oath, as it is now prescribed by our laws; the principal articles of which appear to be at least as ancient as the mirror of justices (c. 1. sect. 2.); and even as the time of Bracton. See l. 3. tr. 1. c. 9. The act of union, statute 5 Ann. c. 8, recites and confirms two preceding statutes; the one of the parliament of Scotland, the other of the parliament of England; which enact, the former, that every king, at his accession, shall take and subscribe an oath to preserve the protestant religion, and presbyterian church government in Scotland; the latter, that at his coronation he shall take and subscribe a similar oath to preserve the settlement of the church of England, within England, Ireland, Wales, and Berwick, and the territories thereunto belonging.

Upon the whole, therefore, it seems clear, that whatever may have become of the *nominal*, the real power of the crown has not been too far weakened by any transactions in the last century. Much is indeed given up; but much is also acquired. The stern commands of prerogative have yielded to the milder voice of influence: the slavish and exploded doctrine of non-resistance has given way to a military establishment by law; and to the disuse of parliaments has succeeded a parliamentary trust of an immense perpetual revenue. When, indeed, by the free operation of the sinking fund, our national debts shall be lessened; when the posture of foreign affairs, and the universal introduction of a well planned and national militia, will suffer our formidable army to be thinned and regulated; and when (in consequence of all) our taxes shall be gradually reduced; this adventitious power of the crown will slowly and imperceptibly diminish, as it slowly and imperceptibly rose. But till that shall happen, it will be our especial duty, as good subjects and good Englishmen, to reverence the crown, and yet guard against corrupt and servile influences from those who are intrusted with its authority; to be loyal, yet free; obedient, and yet independent.

King at Arms, or *of Arms*, is an officer of great antiquity, and anciently of great authority, whose business is to direct the heralds, preside at their chapters, and have the jurisdiction of armoury. In England there are three kings of arms, viz. garter, clarencieux, and norroy.

Garter, principal King at Arms, was instituted by Henry V. His business is to attend the knights of the garter at their assemblies, to marshal the solemnities at the funerals of the highest nobility, and to carry the garter to kings and princes beyond the sea; on which occasion he used to be joined in commission with some principal peer of the kingdom. See Garter.

Clarencieux King at Arms, is so called from the duke of Clarence, to whom he first belonged. His office is to marshal and dispose the funerals of all the inferior nobility, as baronets, knights, esquires, and gentlemen, on the south side of the Trent. See Clarencieux.

Norroy King at Arms, is to do the same on the north side of the river Trent. Clarencieux and Norroy are also called provincial heralds, in regard they divide the kingdom between them into provinces. By charter, they have power to visit noblemen's families, to set down their pedigrees, distinguish their arms, appoint persons their arms, and with Garter to direct the other heralds. Anciently the kings at arms were created and solemnly crowned by the kings of England themselves; but of later days, the earl marshal has a special commission at every creation to personate the king.

Lyon King at Arms, for Scotland, is the second king at arms for Great Britain; he is invested and crowned with great solemnity. To

him belongs the publishing king's proclamations, marshalling funerals, reversing arms, &c. See LYON.

KING (Dr. John), a learned English bishop in the 17th century, bred at Westminster-school, and afterward at Christ-church, Oxford. He was appointed chaplain to queen Elizabeth. In 1605 he was made dean of Christ-church, and was for several years vice-chancellor of Oxford. In 1611 he was advanced to the bishopric of London. Besides his Lectures upon Jonah, delivered at York, he published several sermons. King James I. used to style him the king of preachers; and lord chief justice Coke often declared, that he was the best speaker in the star-chamber in his time. He was so constant in preaching after he was a bishop, that, unless he was hindered by want of health, he omitted no Sunday whereon he did not visit some pulpit in London or near it. Soon after his death, the Papists reported, that he died a member of their church. But the falsity of this story was sufficiently exposed by his son Dr. Henry King, in a sermon at St. Paul's cross soon after; by bishop Godwin in the Appendix to his Commentarius de præsulibus Angliæ, printed in 1622; and by Mr. John Gee, in his book, entitled, The Foot out of the Snare.

KING (Dr. Henry), bishop of Chichester, eldest son of the former, was born in 1591, and educated at Oxford. He became an eminent preacher, and chaplain to king James I. and Charles I. In 1638 he was made dean of Rochester; and in 1641 was advanced to the see of Chichester. Upon the breaking out of the civil wars, and the dissolution of episcopacy, he was treated with great severity by the friends to the parliament; but recovered his bishopric at the restoration. This worthy prelate, who had a most amiable character, died in 1669; and was interred at his cathedral of Chichester, where a monument was erected to his memory. He published, 1. The psalms of David turned into metre. 2. Poems, elegies, paradoxes, and sonnets. 3. Several sermons, and other works.

KING (Edward), an ingenious and promising young man, who was fellow of Christ college, Cambridge, in 1633, and was drowned not long after, in his passage from Chester to Ireland, which melancholy event occasioned Milton's beautiful poem entitled Lycidas. Some of Mr. King's poems are in Nichols's collection of the poets.

KING (Dr. William), an ingenious English writer, was born in London in 1663, and educated at Westminster school, from whence he was elected to Christ church, Oxford, where he was admitted a student in 1686, and entered upon the law line. His first performance was a Vindication of the Character of Wickliffe from the aspersions of Varillas. In 1692 he took his degrees of B. and D. L. L. and the same year was admitted an advocate of doctor's commons. In 1694 he published Animadversions on Lord Molesworth's pretended Account of Denmark, for which he was appointed secretary to the princess Anne. In 1696 he joined in the controversy relative to Phalaris's Epistles, and was rather rudely handled by Dr. Bentley on that occasion. Being of an indolent but pleasant humour, he neglected business, and involved himself in embarrassments, to relieve himself from which he accepted the offer of preferment in Ireland, where he was judge of the high court of admiralty, commissioner of prizes, and keeper of the records in Birmingham's tower. However, with all these advantages he returned to England not much richer than he went in 1708. He interested himself very warmly in favour of Dr. Sacheverel, and wrote some humorous pamphlets on that memorable affair. In 1711 he was appointed Gazette writer, but the fatigues of the office obliged him to resign it in 1712, in which year he died, and was buried in the cloisters of Westminster-abbey. Dr. King was a writer of considerable humour both in prose and verse, and was greatly esteemed by Dr. Swift, and the most eminent writers of that age. Besides his fugitive pieces, which have been collected into three volumes 8vo, he published an Historical Account of the Heathen Gods, 12mo. (*Watkins*).

KING (Dr. William), archbishop of Dublin, was born at Antrim in Ireland, in 1650, and brought up at Trinity college, Dublin. He resisted popery so ably in the reign of James II. that, at the revolution, he was made dean of St. Patrick's, and in 1690 bishop of Derry. The year following he published The State of the Protestants in Ireland, which occasioned considerable observation, and was very serviceable to king William. In 1694 he printed his Discourse concerning the Inventions of Men in the Worship of God, which brought him into a controversy with Mr. Boyse, a dissenting minister at Dublin. In 1702 appeared his greatest work, entituled De Origine Mali, which was animadverted on by Bayle, Leibnitz, and other writers: this year he was promoted to the see of Dublin, where he died in 1729. The late bishop Law published a corrected and enlarged edition of the archbishop's book on the Origin of Evil, in English, with notes. (*Watkins*).

KING (Peter), chancellor of England, was born at Exeter in 1669. His father was a grocer in that city, and intended his son for the same business; but his passion for learning rendered him superior to trade, and he was suffered to follow his inclination. Mr. Locke, who was his uncle, left him half his library at his death, and this, doubtless, was of great service to him. By the advice of that great man he went to Leyden; at his return from whence he entered himself a student of the Inner Temple, where he applied to the law with great assiduity. While he was thus employed he did not neglect other studies, particularly that of ecclesiastical history, for in 1691 he published, but without his name, An Inquiry into the Constitution, Discipline, Unity, and Worship of the Primitive Church, that flourished within the first 300 Years after Christ, 8vo. In 1699 he was chosen into parliament for

Beer-Alston, in Devonshire. In 1702 appeared his History of the Apostle's Creed, a work of great learning and excellence. In 1708 he was chosen recorder of London, and knighted the same year. The following year he was appointed one of the managers of the house of commons on the trial of Dr. Sacheverel. At the accession of George I. he was made chief justice of the court of common pleas. In 1725 he was created a peer by the title of lord King, baron of Ockham in Surrey, and shortly after appointed lord chancellor. He resigned the seals in 1733, and died the same year, leaving behind him four sons and two daughters.

King (William), an English civilian and ingenious writer, born at Stepney in 1685, and educated at Baliol college, Oxford. In 1718 he was chosen principal of St. Mary hall; but, on offering himself a candidate to represent the university in parliament, he resigned that place. Being disappointed in his expectation he went to Ireland, but how long he remained there is not said. While he was in Ireland he wrote a satirical poem, entituled, The Toast, under the name of Scheffer a Laplander. In 1749 he spoke the oration in the theatre at Oxford, on the dedication of Radcliffe's library, for which he is finely complimented by Mr. Warton, in his Triumphs of Isis. Dr. King was a zealous tory, and generally looked upon as disaffected to the Brunswick family, which brought upon him, from various quarters, a torrent of abuse. He published several curious tracts of his own, and also the first five volumes of South's Sermons. He died in 1763.

To King. *v. a.* (from the noun.) 1. To supply with a king (*Shakspeare*). 2. To make royal; to raise to royalty (*Shakspeare*).

King-fish, in ichthyology. See Zeus.

Kings-fisher, in ornithology. See Alcedo.

King's spear, in botany. See Asphodelus.

King of the herrings, in ichthyology. See Gymnetrus.

Kings (books of), two canonical books of the Old Testament, so called, because they contain the history of the kings of Israel and Judah, from the beginning of the reign of Solomon, down to the Babylonish captivity, for the space of near six hundred years. The first book of Kings contains the latter part of the life of David, and his death; the flourishing state of the Israelites under Solomon, his building and dedicating the temple of Jerusalem, his shameful defection from the true religion, and the sudden decay of the Jewish nation after his death, when it was divided into two kingdoms: the rest of the book is taken up in relating the acts of the four kings of Judah and eight of Israel. The second book, which is a continuation of the same history, is a relation of the memorable acts of sixteen kings of Judah, and twelve of Israel, and the end of both kingdoms, by the carrying of the ten tribes captives into Assyria by Salmanassar, and the other two into Babylon by Nebuchadnezzar.

It is probable that these books were composed by Ezra, who extracted them out of the public records, which were kept of what passed in that nation.

King's-county, a county of the province of Leinster in Ireland, taking its name from king Philip of Spain, husband to queen Mary. It is bounded on the north by West Meath; on the south by Tipperary and Queen's-county, from which it is divided by the Barrow; and part of Tipperary and Galway on the west, from which it is separated by the Shannon. It is a fine fruitful country, containing 257,510 Irish plantation acres, 56 parishes, 11 baronies, and two boroughs, and returned six members to parliament. It is about 47 miles long, and 17 broad, and the chief town is Philipstown.

King's evil. See Scrophula.

King George's Sound. See Nootka Sound.

King's bench. See Bench.

King's hounds. The stag-hounds belonging to the royal establishment, continued through every successive reign without variation. The kennel in which they are kept is situate near the race-course upon Ascot Heath; two short miles distant from which is Swinley Lodge, the official residence of the Master of the Stag Hounds, an appointment generally conferred upon a peer, with a salary of 2000l. per annum. The presence of the Master of the Stag Hounds in the field is not a matter of necessity, except when his majesty hunts, and then his personal attendance is indispensable; his badge of office is a pair of gold dog couples, which hang suspended from a belt on his left side. The huntsman has a handsome residence at the kennel, with a salary of 125l. a year; to whom there are allowed six assistants (called yeomen prickers), each having a salary of 104l. with the royal livery richly ornamented, and an annual supply of saddles, bridles, horse-cloths, and stable appendages; but they are obliged to find their own horses.

The hunting season commences on Holyrood-Day, the 25th of September, and continues every Tuesday and Saturday till the first week in May; with the exception of Christmas and Easter weeks, when the hounds hunt three times in each. Holyrood-Day and Easter-Monday are the two grand days of the year for company, and the field is then exceedingly numerous. His majesty has also a pack of harriers, which are kept at the Little Park Lodge near Windsor, and with these he hunts constantly in Windsor Great Park, and the surrounding neighbourhood; these are, however, a private concern of the king's, and not included in the regular crown establishment.

King's plate. The plates thus denominated are a free gift from his majesty of 100 guineas each; originally granted to certain towns as a mean of exciting emulation, and improving the breed of horses in general. Newmarket, as the spot of chief celebrity, is particularly honoured, having two king's plates in the first Spring, and one in the first October meeting. King's plates are also given at New-

castle-upon-Tyne, Guilford, Winchester, Ipswich, Burford, Chelmsford, Nottingham, Lewes, Edinburgh, York, Canterbury, Warwick, Lichfield, Richmond, (Yorkshire), Lincoln, Salisbury, Ayr, Carlisle, and Ascot-Heath; the whole of which, except the last, are run for by horses or mares of different ages, carrying such weights as shall be appointed by the Master of the Horse, or whomsoever he may delegate for that purpose.

The King's plate of 100 guineas, given at Ascot, and always run for on the first day (invariably Whit-Tuesday fortnight), is only for horses which have regularly hunted with his majesty's stag hounds the preceding season, and must have been well up with the hounds, at their pursuing, taking, or killing, ten deer, as an indispensable qualification. At the conclusion of the chase, when the deer is secured, those who intend to qualify for the plate apply to the huntsman, and a ticket is delivered to the rider, bearing the arms of the Master of the Stag Hounds, and the seal of the royal hunt; ten tickets being thus obtained, the horse has secured his qualification, and may be withdrawn from the field, and is not obliged to appear again till the day of entrance at Sunning-Hill Wells; where and when the tickets must be produced, in proof of a due qualification to start. For the accommodation of sportsmen in general, horses of all ages are permitted to run, carrying the following weights: four years old, 11st. 2lb. five years old, 11st. 9lb. six years old, 11st 12lb. and aged 12st. Mares allowed 4lb. The best of three four-mile heats.

The following rules are, by his majesty's command, to be strictly observed by the owners and riders of all such horses, mares, or geldings, as shall run for the king's plates at Newmarket.

King's Plate Articles.—Every person that putteth in a horse, mare, or gelding, for the said plate, is to shew such horse, mare, or gelding, with the marks, name, and name of the owner, to be entered at the king's stables in Newmarket the day before they run, and shall then produce a certificate under the hand of the breeder, specifying his exact age the grass before.

Every horse, mare, or gelding, that runneth, is to start between the hours of one and four in the afternoon; and to be allowed half an hour between each heat to rub.

Every horse, mare, or gelding, that runneth on the wrong side the posts or flags, or is distanced in any of the heats, shall have no share of the said plate, nor be suffered to start again.

The horse, mare, or gelding, that winneth any two heats, winneth the plate; but if three several horses, mares, or geldings, win each of them a heat, then those three, and only they, to run a fourth; and the horse, mare, or gelding, that winneth the fourth heat, shall have the plate.

And each horse, mare, or gelding's place, as he or they come in by the ending-post each heat, as first, second, or third, &c. shall be determined by such judges as shall be appointed for that purpose by the Master of the Horse. And in case any horse, mare, or gelding, shall be then, or after prove to be, above the age certified the grass before, the owner or owners of such horse, mare, or gelding, shall be rendered incapable of ever running for any of the king's plates hereafter.

As many of the riders as shall cross, jostle, or strike, or use any other foul play, to be judged by such person or persons as shall be appointed by the master of the horse, such rider shall be made incapable of ever riding any horse, mare, or gelding, for any of his majesty's plates hereafter; and such owners shall have no benefit of that plate; but such owners may be permitted to run any horse, mare, or gelding, for any other of his majesty's free plates in future.

Every rider shall, immediately after each heat is run, be obliged to come to the ending-post with his horse, mare, or gelding, then and there to alight, and not before, and there to weigh to the satisfaction of the judges appointed for that purpose.

And in case of neglect or refusal thereof, such winners and riders shall be immediately declared incapable of running or riding any more for this or any of his majesty's plates in future.

And should any difference arise relating to their ages, or in their running, or to these his majesty's orders, the same to be determined by such person, or persons, as shall be appointed by the master of the horse. And these articles are to continue in force, unless altered by command of his majesty.

For the better and more certain prevention of any fraud, or misapplication, the winner of a king's plate is to receive from the clerk of the course a certificate signed by the steward of the race where such plate is won, countersigned by himself also, which being presented to the lord lieutenant of the county, it obtains his signature likewise: when thus sanctioned, it becomes payable at sight to bearer (if properly endorsed by the winner) at the office of the clerk of his majesty's stables, in the King's Mews, London. The lord lieutenant of a county being out of the kingdom, the signature of any person regularly deputed by him is sufficient. The certificate of winning the plate at Ascot requires only the signature of the master of his majesty's stag hounds, instead of the lord lieutenant of the county.

KI'NGCRAFT. *s.* (*king* and *craft.*) The art of governing (*King James*).

KI'NGCUP. *s.* (*king* and *cup.*) A flower (*Gay*).

KI'NGDOM. *s.* (from *king.*) 1. The dominion of a king; the territories subject to a monarch (*Shakspeare*). 2. A different class or order of beings: as, the *mineral*, the *vegetable*, and the *animal* kingdom (*Locke*). 3. A region; a tract (*Shakspeare*).

KINGHORN, a parliament town in the county of Fife in Scotland, on the Frith of Forth, directly opposite to Leith. Here is a

manufacture of thread-stockings knit by the women; the men, being chiefly mariners, are employed in coasting ships, in the fishery, or the passage-boats from hence to Leith, from which the town of Kinghorn derives considerable advantage. This place gives a second title to the earl of Strathmore.

KI'NGLIKE. KI'NGLY. *a.* (from *king*.) 1. Royal; sovereign; monarchical (*Shaksp.*). 2. Belonging to a king (*Shakspeare*). 3. Noble; august; magnificent (*Sidney*).

KI'NGLY. *ad.* With an air of royalty; with superiour dignity (*Milton*).

KING-PIECE or KING-POST, is a piece of timber set upright in the middle, between two principal rafters, and having struts or braces going from it to the middle of each rafter.

KINGSBRIDGE, a town of Devonshire, 217 miles from London. It is a pretty place, with a harbour for boats, a free-school, a market, and a fair.

KING'S FERRY, in Kent, the common way from the main land into the isle of Sheppey; where a cable of about 140 fathoms in length, fastened at each end across the water, serves to get the boat over by hand. For the maintenance of this ferry, and keeping up the highway leading to it through the marshes for above a mile in length, and for supporting a wall against the sea, the land occupiers tax themselves yearly one penny per acre for fresh marsh land, and one penny for every ten acres of salt marsh land. Here is a house for the ferry-keeper, who is obliged to tow all travellers over free, except on these four days, viz. Palm Monday, Whit Monday, St. James's day, and Michaelmas day, when a horseman pays two-pence, and a footman one penny. But on Sundays, or after eight o'clock at night, the ferry-keeper demands sixpence of every horseman, and two-pence of every footman, whether strangers or the land occupiers.

KI'NGSHIP. *s.* (from *king.*) Royalty; monarchy (*King Charles*).

KINGSTON, a town of United America, in the state of New York, situated on the Hudson's River: eighty miles N. New York, and thirty-eight S. Albany.

KINGSTON, a town of United America, in the state of North Carolina: thirty-two miles W. Newbern.

KINGSTON, a town of United America, in the state of South Carolina: eighty-two miles N.E. Charlestown. Lon. 78. 54 W. Lat. 33. 52 N.

KINGSTON, a seaport town on the south coast of the island of Jamaica, built in the year 1692-3, on the north side of a beautiful harbour, after the destruction of Port Royal. Mr. Edwards, in his History of the West Indies, says, "It contains 1665 houses, besides negro huts and warehouses. The number of white inhabitants, in the year 1788, was 6539, of free people of colour 3280, of slaves 16,659, total number of inhabitants, of all complexions and conditions, 26,478. It is a place of great trade and opulence. Many of the houses in the upper part of the town are extremely magnificent; and the markets for butcher's meat, turtle, fish, poultry, fruits, and vegetables, &c. are inferior to none. I can add, too, from the information of a learned and ingenious friend, who kept comparative registers of mortality, that since the surrounding country is become cleared of wood, this town is found to be as healthful as any in Europe:" ten miles E. Spanish Town. Lon. 76. 33 W. Greenwich. Lat. 18. N.

KINGSTON UPON HULL. See HULL.

KINGSTON UPON THAMES, a town of England, in the county of Surry, situated on the river Thames, as its name imports, and once the residence of the Saxon kings, several of whom were crowned here. The lent assizes for the county are held here. It once returned members to the British parliament, but was disfranchised by the desire of the inhabitants. Here is a weekly market on Saturday: eighteen miles N.N.E. Guildford, and eleven and a half S.W. London.

KINGTON, or KYNETON, a pretty large town in Herefordshire, 146 miles from London. It is situated on the river Arrow, and is inhabited chiefly by clothiers, who drive a considerable trade in narrow cloth. It has a charity-school, a market, and three fairs.

KING-TE-TCHING, a town of China, in the province of Kiang-si. This town, where the best makers of china-ware live, is as populous as the greatest cities of China, and wants nothing but walls to make it a city. These places are called *tching*, that are of great resort and commerce, but not walled. They compute in this town more than 1,000,000 of souls. They consume here every day more than 10,000 loads of rice, and above 1000 hogs, without mentioning other animals which they feed upon. The lodgings of the great merchants take up a vast space, and contain a prodigious number of workmen. King-te-tching is a league and a half long, standing on the side of a fine river; the streets are very long, and cut and cross one another at certain distances; all the ground is made use of, so that the houses are too much confined, and the streets too narrow; in going through them, one seems to be in the middle of a fair, and hears on all sides the noise the porters make to clear the way. Strangers are not permitted to lie at King-te-tching; they must either pass the night in their barks, or lodge with their acquaintance, who pass their word for their conduct: 655 miles S. Peking. Lon. 134. 40 E. Ferro. Lat. 29. 25 N.

KINNOR. See CHINNOR.

KINO. (*kino*, Indian.) Gummi gambiense. Gummi rubrum adstringens gambiense. The tree from which this resin is obtained, though not botanically ascertained, is known to grow on the banks of the river Gambia, in Africa. On wounding its bark the fluid kino immediately issues drop by drop, and by the heat of the sun, is formed into hard masses. It is very like the resin called Sanguis draconis; is much redder, more firm, resinous, and adstringent than catechu. It is now in common use, and

is the most efficacious vegetable adstringent, or styptic, in the materia medica.

KINOLI, a town of Asiatic Turkey, in the province of Natolia, on the coast of the Black Sea: sixteen miles N.W. Sinob.

KINROSS, a town of Scotland, in the county of the same name, on the river Leven, before it enters Loch Leven. The principal trade is in the linen manufacture and cutlery: ten miles S. Perth, and eighteen N.N.W Edinburgh.

KINROSSSHIRE, a county of Scotland, bounded on the north-cast, east, and south by the county of Fife, on the other by part of the county of Perth; almost circular, and about thirty miles in circumference. Kinross is the principal town.

KINSALE, a town of Ireland, in the county of Cork, situated at the mouth of the river Bandon, which forms a fine harbour, called the Harbour of Kinsale, and is navigable for large sloops near twelve miles above the town, though a bar prevents large men of war coming into the bason. In this port there is a dock furnished with stores for the use of the navy. The entrance of the harbour is defended by a fort, which, having been constructed in the reign of Charles II. is called Charlesfort, and in which there is always a good garrison. The town, which contains at least 10,000 inhabitants, is built on the side of Compass-hill, and close to the water's edge: twelve miles S. Cork. Lon. 8. 30 W. Greenwich. Lat. 51. 43 N.

KI'NSFOLK. *s.* (*kin* and *folk.*) Relations; those who are of the same family (*Spectator*).

KINSIMA, or THE ISLAND OF GOLD, an island of Japan.

KI'NSMAN. *s.* (*kin* and *man.*) A man of the same race or family (*Addison*).

KI'NSWOMAN. *s.* (*kin* and *woman.*) A female relation (*Dennis*).

KINTORE, a royal borough of Aberdeenshire in Scotland, situated on the river Don, in lon. 2. 5 W. lat. 57. 38. N. It gives the title of earl to a branch of the noble family of Keith, but in other respects is inconsiderable.

KINTYRE. See CANTIRE.

KIOF, a town of Poland, in a palatinate of the same name, with an archbishop's see, and a castle. It is the capital of the Russian government of Kiof, and carries on a considerable trade. It is divided into the Old and New Town, and seated on the W. side of the Dneiper, 180 miles N.E. of Kaminieck, and 335 E. by S. of Warsaw. Lon. 31. 51 E. Lat. 50. 30 N.

KIOF, or KIOW, a government of the Russian empire, being part of the Ukraine, or Little Russia. It lies on the E. side of the Dneiper, although Kiof, the capital, is on the W. side. It was once a duchy, belonging to the great dukes of Russia, and Kiof was their capital.

KIPPIS (Andrew, D.D. F.R. and A.S.), was born at Nottingham, March 28 (O.S.) 1725. His father, a respectable tradesman of that town, was descended from the Rev. Benjamin King of Oakham, Rutlandshire, an ejected minister; and his mother, Ann Ryther, was the grand-daughter of the Rev. John Ryther, who was ejected from the church of Fernby, in the county of York. In the year 1730, he lost his father, and went to reside with his grandfather, Andrew Kippis of Sleaford in Lincolnshire. He received his classical education at the grammar school in that town; but what contributed most to his future eminence, was the friendship of the Rev. Mr. Merrival, who was equalled by few of his contemporaries in various branches of learning, particularly in his acquaintance with the classics, his knowledge of ancient and modern history, and his refined taste in the belles lettres. Dr. Kippis frequently said, that it was impossible for him to express his obligations to this friend of his youth. In 1741 he removed to Northampton, and commenced his academical studies under Dr. Doddridge. After a residence of five years at the academy, he was invited by several congregations to become their minister. Though he was pressed to settle at Dorchester, and had been chosen their minister, he gave the preference to an invitation from Boston in Lincolnshire, where he went to reside in September 1746. Here he continued four years; and in November 1750, accepted the pastoral charge of a congregation at Dorking in Surry. The congregation meeting in Princes-street, Westminster, having been without a minister about two years, he was chosen, in June 1753, to succeed the Rev. Dr. Obadiah Hughes. On the 21st of September following, he married, at Boston, Miss Elizabeth Bott, one of the daughters of Mr. Isaac Bott, a merchant of that place; and in the month of October fixed his residence in Westminster. In June 1767, he received the degree of D.D. from the University of Edinburgh, on the unsolicited recommendation of the late learned professor Robertson. He was elected a member of the Society of Antiquaries on the 19th of March 1778; and on the 17th of June 1779, he was chosen a Fellow of the Royal Society. In both Societies he had the honour of being in the council two years.

The powers of mind which he derived from nature, and which he had cultivated with unremitting diligence and peculiar success, were not to be confined to the narrow limits of private life and the duties of the pastoral charge, however important; they were designed for more extensive and important services to his country and to mankind. The interests of literature, science, and religion, have received from the exertion of his talents as a writer the most essential advantages. His first efforts in literature were made in the Gentleman's Magazine, a periodical publication called the Library, and the Monthly Review; to each of which he contributed many important articles, especially in the historical and philological departments of the last. He was the author of three tracts, viz. A Vindication of the Protestant Dissenting Ministers, &c.; Observations on the late Contests in the Royal Society;

a tame and insipid work; and Considerations on the Treaty with America, &c. His improved edition of Dr. Doddridge's Lectures is a work of great value, though it is certainly overladen with references; and the History of Knowledge, Learning, and Taste, in Great Britain, prefixed to the New Annual Register, merits, and has received, the approbation of the public. His Life of Dr. Doddridge is an interesting piece of biography; but inferior to that by Job Orton. He published at different times several single sermons; among which, that on the death of his friend the Rev. Mr. Laugher, is intitled to high praise. The greater part of these he republished, with other practical discourses, in the year 1794: but the work which, next to the studies immediately connected with his office as a Christian minister, engaged his principal attention, and by which he has long been distinguished, is, the improved edition of the Biographia Britannica. In this great national publication, the correctness of his judgment, the extent of his information, his indefatigable researches and unremitting assiduity, his peculiar talent of appreciating the merits and analyzing the labours of the most eminent writers, and his unbiassed fidelity, and impartial decision on the characters of the philosopher, statesman, poet, scholar, and divine, are strongly displayed, and universally acknowledged. His style, formed on the models of Sir William Temple and Addison, is remarkable for its elegance and purity; though it is often cold and feeble, force being in such cases sacrificed to verbal correctness, the attention being more bent towards the latter than towards the former. Dr. Kippis died Oct. 8, 1795. He will long be remembered as a man of learning and taste; but had he thought more, and read less, he would have attained still higher eminence.

KIRBY. See KIRKBY.

KIRCH (Christian Frederick), of Berlin, a celebrated astronomer, was born at Guben in 1694. He acquired great reputation in the observatories of Dantzic and Berlin. Godfrey Kirch his father, and Mary his mother, also acquired considerable reputation by their astronomical observations. This family corresponded with all the learned societies of Europe, and their astronomical works are in great repute.

KIRCHER (Athanasius), a famous philosopher and mathematician, was born at Fulde in 1601. He entered into the society of the Jesuits in 1618, and taught philosophy, mathematics, the Hebrew and Syriac languages, in the university of Wirtsburg, with great applause, till the year 1631. He retired to France on account of the ravages committed by the Swedes in Franconia, and lived some time at Avignon. He was afterwards called to Rome, where he taught mathematics in the Roman college, collected a rich cabinet of machines and antiquities, and died in 1680, in the 80th year of his age.

The quantity of his works is immense, amounting to 22 volumes in folio, 11 in quarto, and three in octavo; enough to employ a man for a great part of his life even to transcribe them. Most of them are rather curious than useful; many of them visionary and fanciful; and it is not to be wondered at, if they are not always accompanied with the greatest exactness and precision. The principal of them are, 1. Prælusiones Magneticæ. 2. Primitiæ Gnomonicæ Catoptricæ. 3. Ars magna Lucis et Umbræ. 4. Musurgia Universalis. 5. Obeliscus Pamphilius. 6. Oedipus Ægyptiacus; four volumes folio. 7. Itinerarium Extaticum. 8. Obeliscus Ægyptiacus; four volumes folio. 9. Mundus Subterraneus. 10. China Illustrata.

KIRIATHAIM, in ancient geography, one of the towns built by the Reubenites; reckoned to the tribe of Reuben (Joshua, xiii.), twelve miles to the west of Midaba. The ancient residence of the giants called Emim.

KIRIATH-ARBA. See HEBRON.

KIRIATH-BAAL, or CARIATH-BAAL, called also KIRIATH-JEARIM, the city of the woods; one of the cities of the Gibeonites belonging to the tribe of Judah, nine miles from Aelia, in the road to Diospolis. It was also called Baala (Joshua). The ark of the covenant, after its recovery from the Philistines, stood for some time in this city (1 Sam. vii).

KIRK, a Saxon term, signifying the same with church. The word is now used in that sense in Scotland.

KIRK-SESSIONS, the name of a petty ecclesiastical judicatory in Scotland. Each parish, according to its extent, is divided into several particular districts; every one of which has its own elder and deacon to oversee it. A consistory of the ministers, elders, and deacons of a parish form a kirk-session. These meet once a week, the minister being their moderator, but without a negative voice. It regulates matters relating to public worship, elections, catechising, visitations, &c. It judges in matters of less scandal; but greater, as adultery, are left to the presbytery; and in all cases an appeal lies from it to the presbytery. Kirk-sessions have likewise the care of the poor and poor's-funds.

KIRKBY LONSDALE, a town of England, in the county of Westmoreland, situated in a valley, on the river Lune, with a weekly market on Thursday: twelve miles S.E. Kendal, and 250 N.N.W. London. Lon. 2. 57 W. Lat. 54. 3 N.

KIRKBY MORESIDE, a town of England, in the county of York, with a weekly market on Wednesday: twenty-eight miles N. York, and 225 N. London. Lon. 1. 3 W. Lat. 54. 26 N.

KIRKBY STEVEN, or STEVEN CHURCH, a town of England, in the county of Westmoreland, on the west side of the river Eden, near the borders of Yorkshire, with a weekly market on Monday: twenty-four miles N.N.E. Kendal, and 281 N.N.W. London. Lon. 2. 30 W. Lat. 54. 26 N.

KIRKCALDY, a seaport in Fifeshire, on the frith of Forth, with a dockyard for small vessels, and a silk manufacture. It is ten

miles N. of Leith. Lon. 3. 8 W. Lat. 56. 8 N.

KIRKCUDBRIGHT, a seaport in Kirkcudbrightshire, at the mouth of the river Dee. It has a fine harbour, which will admit ships of any burden to come up to the town, and yet has but an inconsiderable trade. It is 60 miles W. of Carlisle, and 83 S.W. of Edinburgh. Lon. 4. 8 W. Lat. 55. 0 N.

KIRKCUDBRIGHTSHIRE, a county or stewartry of Scotland, which once formed, with Wigtonshire, the ancient province of Galloway. It is 45 miles long and 30 broad; bounded on the N.E. by Ayrshire and Dumfriesshire, on the S. by Solway Frith and the Irish Sea, and on the W. by Wigtonshire and Ayrshire. In 1798, the number of inhabitants in this county was 27000.

KIRKHAM, a town in Lancashire, with a market on Tuesday. It has a considerable manufacture of sailcloth, and is seated at the mouth of the Ribble, 18 miles S. of Lancaster, and 223 N.N.W. of London. Lon. 2. 58 W. Lat. 53. 46 N.

KIRKLEES, a village in the W. riding of Yorkshire, situate on the Calder, three miles from Huddersfield. In the park near it, is the monument of the famous Robin Hood; and on the adjacent moor are two hills, called Robin Hood's butts.

KIRKLAND (Dr. Thomas), an eminent physician, and member of the royal medical society at Edinburgh, and the medical society at London. He died at Ashby de la Zouch in Leicestershire, in 1798, aged 78. He was a zealous enquirer after science, and a successful practitioner. He published some valuable works: one in particular, entituled, An Enquiry into the present State of Medical Surgery.

KIRKOSWOLD, a town in Cumberland, with a market on Thursday; seated on a hill, near the river Eden, nine miles N. by E. of Penrith, and 292 N.W. of London. Lon. 2. 48 W. Lat. 54. 48 N.

KIRKPATRICK, a town in Dumbartonshire, lying E. of Dumbarton. It is said to be the birthplace of the tutelary saint of Ireland. The vestiges of the Roman wall, built by Antoninus, extend from the frith of Clyde at this place, to the frith of Forth. It is called, by the country people, Graham's Dike.

KIRKWALL, a borough of Scotland, capital of Mainland, the principal of the Orkney Islands. It is built on an inlet of the sea on the E. side of the island; and the most striking object is the stately cathedral of St. Magnus. It is 30 miles N.E. of Thurso, in Caithness-shire. Lon. 2. 57 W. Lat. 58. 54 N.

KIRN, a town of Germany, in the circle of Upper Rhine, situate on the Nahe, 17 miles W. of Creutznach. Lon. 7. 6 E. Lat. 49. 50 N.

KIRSTENIUS (Peter), an eminent physician, and professor at Upsal in Sweden, was born at Breslaw in Silesia, in 1577. He made an astonishing progress in all parts of learning, particularly in the sciences connected with physic. He was profoundly skilled in Arabic, besides which he understood twenty-five other languages. He died in 1640. His works are numerous; the chief are, 1. Grammatica Arabica, 1608; 2. Vitæ quatuor evangelistarum ex antiquissimo codice MS. Arabico erutæ, 1609, folio.

KIRTLE, a term used for a short jacket; also for a quantity of flax about a hundred-weight.

KIRTON, or KIRKTON, a town of Lincolnshire, 151 miles from London. It had its name from its kirk or church, which is truly magnificent. It has a market and two fairs. This place is famous for the pippin, which, when grafted on its stock, is called the rennet. It gives names to its hundreds, in which are four villages of the same name.

To KISS. *v. a.* (*cusan*, Welsh; κυω.) 1. To touch with the lips (*Sidney*). 2. To treat with fondness (*Shakspeare*). 3. To touch gently (*Shakspeare*).

KISS. *s.* (from the verb.) Salute given by joining lips (*Dryden*).

KI'SSER. *s.* (from *kiss.*) One that kisses.

KISSER, the ancient Colonia Assuras in Africa, as appears from many inscriptions still to be met with in the place. Here is a triumphal arch done in a very good taste; there is also a small temple of a square figure, having several instruments of sacrifice carved upon it; but the execution is much inferior to the design, which is very curious. The town is situated in the kingdom of Tunis, on the declivity of a hill, above a large fertile plain; which is still called the plain of Surso, probably from its ancient name Assuras.

KISSING, by way of salutation, or as a token of respect, has been practised in all nations. The Roman emperors saluted their principal officers by a kiss. Kissing the mouth or the eyes was the usual compliment upon any promotion or happy event. Soldiers kissed the general's hand when he quitted his office. Fathers, amongst the Romans, had so much delicacy, that they never embraced their wives in the presence of their daughters. Near relations were allowed to kiss their female kindred on the mouth: but this was done in order to know whether they smelt of wine or not; because the Roman ladies, in spite of a prohibition to the contrary, were found sometimes to have made too free with the juice of the grape. Slaves kissed their master's hand, who used to hold it out to them for that purpose. Kissing was a customary mode of salutation amongst the Jews, as we may collect from the circumstance of Judas approaching his Master with a kiss. Relations used to kiss their kindred when dying, and when dead; when dying, out of a strange opinion that they should imbibe the departing soul; and when dead, by way of valedictory ceremony.

KISSING CURVES. See OSCULATORY CURVES.

KI'SSINGCRUST. *s.* (*kissing* and *crust.*) Crust formed where one loaf in the oven touches another (*King*).

KISTI, one of the seven Caucasian nations, that inhabit the countries between the Black Sea and the Caspian. This nation extends from the highest ridge of Caucasus, along the Sundsha rivulets. They are bounded on the W. by Little Cabarda, to the E. by the Tartars and Lesguis, and to the S. by the Lesguis and Georgians. They consist of sixteen different districts or tribes, which are generally at variance with each other, and with their neighbours. Those belonging to the districts of Wapi, Angusht, and Shalka, submitted to Russia in 1770. The Tshetshen tribe is so numerous and warlike, and has given the Russians so much trouble, that its name is usually given by them to the whole Kisti nation. The Ingushi, who are capable of arming above 5000 men, live in villages near each other: they are diligent husbandmen, and rich in cattle. Many of their villages have a stone tower, which serves in time of war as a retreat to their women and children, and a magazine for their effects. These people are all armed, and have the custom of wearing shields. Their religion is very simple, but has some traces of Christianity. They believe in one God, whom they call Dailé, but have no saints or religious persons. They celebrate Sunday, not by any religious ceremony, but by resting from labour. They have a fast in spring, and another in summer; but observe no ceremonies either at births or deaths. They allow of polygamy, and eat pork.

KISTNA, a river of Hindustan, which rises on the E. side of the Gauts, forms the boundary between the Deccan and the Peninsula, and falls into the bay of Bengal, S. of Masulipatam.

KISTNAGHERI, a town and fortress of the peninsula of Hindustan, in Mysore. This town was attacked by the British troops under colonel Maxwell, in 1789: he carried the lower fort and suburb, without much difficulty; but the garrison in the upper fort made so desperate a resistance, that, after two hours vigorous assault, he found it necessary to desist from the attempt. It is 54 miles S.E. of Bangalore, and 66 W.S.W. of Arcot.

KIT. *s.* (*kitte*, Dutch.) 1. A large bottle (*Skinner*). 2. A small wooden vessel.

Kit, in music, the name of a small violin of such form and dimension as to be capable of being carried in a case or sheath in the pocket. Its length, measuring from the extremities, is about 16 inches, and that of the bow about 17. Small as this instrument is, its powers are coextensive with those of the violin.

Kit-kat club, an association of above 30 noblemen and gentlemen of distinguished merit, formed in 1703, purely to unite their zeal in favour of the Protestant succession in the house of Hanover. Their name was derived from Christopher Kat, a pastry-cook, near the tavern where they met in King's-street, Westminster, who often supplied them with tarts.

KITAIBELIA. In botany, a genus of the class monadelphia, order polyandria. Calyx double, the outermost seven or nine-cleft; capsules one-seeded, clustered in a five-lobed head. One species, a native of Hungary; viscid-hairy; with white axillary flowers, binate or ternate.

KI'TCHEN. *s.* (*kegin*, Welsh; *kyshen*, Erse.) The room in a house where the provisions are cooked (*Hooker*).

KI'TCHENGARDEN. *s.* Garden in which esculent plants are produced. See Gardening.

KI'TCHENMAID. *s.* A maid under the cookmaid.

KI'TCHENSTUFF. *s.* The fat of meat scummed off the pot, or gathered out of the dripping-pan (*Donne*).

KI'TCHENWENCH. *s.* Scullion; maid employed to clean the instruments of cookery (*Shakspeare*).

KI'TCHENWORK. *s.* Cookery; work done in the kitchen.

KITE. *s.* (cyta, Saxon.) 1. A bird of prey that infests the farms, and steals the chickens. See Falco. 2. A name of reproach denoting rapacity (*Shakspeare*). 3. A fictitious bird made of paper (*Gov. of the Tongue*).

KI'TTEN. *s.* (*katteken*, Dutch. It is probable that the true singular is *kit*, the diminutive of *cat*, of which the old plural was *kitten*, or *young cats*.) A young cat (*Prior*).

To Ki'tten. *v. n.* (from the noun.) To bring forth young cats (*Shakspeare*).

KITTIWAKE, in ornithology. See Larus.

KITTERY, a town of the United States, in the district of Main. It is famous for ship-building, and seated on the E. side of the mouth of Piscataqua River.

KITZINGEN, a town of Franconia, on the Maine. It is large and handsome, and owes its rise to a noble convent of Benedictines, founded in the year 745, by duke Pepin. It is 10 miles E.S.E. of Wurtzburg, and 34 N.N.W. of Anspach. Lon. 10. 4 E. Lat. 49. 40 N.

KIUN-TCHEOU-FOU, the capital of the island of Hainan, seated on its N. coast, opposite to the province of Quang-tong, in China. It stands on a promontory, and ships often anchor at the bottom of its walls. Its district contains three cities of the second, and ten of the third class.

KIUTAJA, or Cutaja, a town of Turkey in Asia, the residence of the beglerbeg of Natolia. Near it are some warm baths, much esteemed in several disorders. It is situate at the foot of a mountain, near the river Pursak, 136 miles S.S.E. of Constantinople. Lon. 30. 44 E. Lat. 39. 14 N.

KLEINHOFIA. In botany, a genus of the class dodecandria, order monogynia. Calyx five-leaved; petals five; nectary campanulate, five-toothed, bearing the stamens, seated on the column of the germ; germ pedicelled; capsule five-angled, five-celled, inflated; the cells one-seeded. One species; a tree of Java and Amboina, with racemed, numerous, bright, purple flowers.

KLEINIA. In botany, a genus of the class

syngenesia, order polygamia æqualis. Receptacle naked; down simple; calyx simple, equal, many-leaved. Four species; natives of India or America.

KLETTENBERG, a town of Swisserland, seated on the Aar, three miles from Waldschut. The spiritual jurisdiction belongs to the bishop of Constance; the sovereignty to the cantons. Lon. 8. 12 E. Lat. 47. 35 N.

To KLICK. *v. n.* (from *clack.*) 1. To make a small sharp noise. 2. To steal away suddenly with a snatch.

KLINGSTADT, a celebrated painter, was born at Riga in Livonia, in 1657, and died at Paris in 1734. He excelled in miniature painting, particularly in pictures on snuff-boxes, for which he had extravagant prices.

KLOCKER (David), an historical and portrait painter, was born at Hamburgh in 1629. He travelled into Italy to improve himself, after which he settled at Stockholm, where he was greatly patronised by the king, so that few of his paintings are to be seen out of that country. He died in 1698.

KLOPSTOCK (Frederic Theophilus), a most eminent and deservedly celebrated German poet, was born at Quedlinburg, July 2, 1724. During the first thirteen years of his life he lived in his father's house, under the care of a private tutor. The next three years he passed at a public school at Quedlinburg, preparatory to his introduction to college, which he entered at the age of sixteen. His father, who had hitherto proceeded on a system of indulgence, and had allowed him to devote much of his time to athletic exercises and sports, now represented to him the necessity of applying assiduously to his studies. This counsel was not lost upon him. He soon "acquired a perfect knowledge of the classics, entered into all the beauties of the ancient authors, and while he followed with rapture the bold flights of their original genius, he fed a flame within himself which was soon to burst forth in full lustre." Virgil was his favourite author, and he chose him for his model, in the resolution he formed, after trying the strength of his wing in short poetical excursions, of producing an epic poem; a species of composition hitherto unknown in Germany. The indignation he felt at some Frenchman, who denied to the Germans any talent for poetry, concurred with more legitimate motives in provoking him to this grand effort. After much doubt and hesitation as to a subject, he at last formed the plan of his Messiah: and this choice, it appears, he made before he was acquainted with the Paradise Lost; a poem of which he became afterwards a most passionate admirer. In speaking of his project to his friend Bodmer, he observes; "How happy shall I be, if by the completion of the Messiah I may contribute somewhat to the glory of our great and divine religion! How sweet and transporting is this idea to my mind! That is my great reward."

For his poetical talent Klopstock was evidently indebted to nature, and not to cultivation. In his early years he had scarcely any access to poetical writings. His father's library did not contain a single poet, though it contained many Bibles. This blessed book his taste soon distinguished from all others. While yet a child he made it his constant companion, and thus became thoroughly acquainted with the figurative language with which it abounds. The magnificent descriptions and glowing imagery contained in the book of Job and in the Prophets, laid strong hold on his mind; nor was he less affected by those pathetic passages which represent fallen man as finding mercy at the hands of his offended God; while the view he obtained from Scripture of the greatness and glory of the Messiah excited lively feelings of love and grateful adoration. "From this turn of mind sprung a style of writing full of poetry, before he had ever seen a verse, or knew any thing of prosody."

At nineteen Klopstock entered the university of Jena; but, disgusted with the scholastic theology and metaphysical subtleties which formed its chief pursuits, he removed to the university of Leipsic. While at Jena, he composed the first three books of the Messiah, in hexameter verse, being the first attempt which had been made to introduce that metre into the German language. It was first communicated to some literary friends at Leipsic, whose admiration animated him to prosecute the plan he had sketched out, although the public taste was not yet prepared to relish the lofty flights of his genius. In the course of three or four years, however, this poem awakened an extraordinary degree of interest in Germany. Both its friends and enemies were numerous. Preachers quoted it from the pulpit; Christians loved it, because it served to excite their devout feelings; the Swiss critics, especially Bodmer, extolled it with enthusiasm; and at length its intrinsic excellence overcame all opposition.

The Danish minister, Count Bernstorff, being much struck with his poem, recommended him, about this time, to the king of Denmark, by whom he was invited to reside at Copenhagen, on a pension, which relieved him, for the remainder of his life, from pecuniary care, and left him at liberty to pursue his studies. In his way to Copenhagen, in 1751, he passed through Hamburg, and there first saw the lovely Margaretta Möller; this lady soon consoled him for a former severe disappointment, and in about three years more made him the happiest of men. An account of the commencement and progress of their acquaintance is given by Mrs. Klopstock herself, in a letter to Mr. Richardson, the English novelist, a letter which is published in Richardson's Correspondence, as well as in Miss Smith's Memoirs of Klopstock. This letter was written in March 1758, after she and Klopstock had been married four years. She died Nov. 28th the same year. This affliction was deeply felt by Klopstock, whose letters to his friends for a long time after the event evince the tenderest affection, and profoundest grief, attempered only by a perfect resignation

to the will of God. After the death of his wife, Klopstock continued to reside at Copenhagen till the year 1771, when he removed to Hamburg, where he lived during the residue of his life, except for about a year, which he passed at the court of Baden. In 1791, when in his 68th year, he married a near relation of his first wife, to whom he was indebted for much of the comfort he enjoyed in his declining years. "To the close of life he retained his poetical powers; and his sacred harp still sent forth strains of sublime and heart-felt piety." He died at Hamburg in 1803, in the 80th year of his age, "with a firm expectation of happiness beyond the grave." Our readers will be anxious to learn something of the last hours of this extraordinary man, and we are willing to gratify them.

"His strong feelings of religion," we are told, "shed a lustre on his last moments, when he displayed a noble example of what he had often sung in his divine poems. He preserved his gentle animation, his fervent piety, and the admirable serenity of his mind, till the close of life. To the last his heart was as warm as ever; and the hopes which had supported him through all his trials continued unshaken to his last moments. He spoke of death with the most cheerful composure. The pleasing images of immortality sung by his own lofty muse recurred to his mind in the moment of trial, and whispered comfort to his spirit as it fled.—His soul had been undismayed at the symptoms of decay which increased every year. His strength was greatly diminished in the winter of 1802, but he was still pleased with the visits of his friends."

"In the last weeks of his life he secluded himself entirely, even from those who were most dear to him. He sent them many kind messages, but declined seeing them. Tranquillity of mind, resignation to the will of God, warm emotions of gratitude for the happiness he had enjoyed in life, gentle endurance of the pains of death, a calm prospect of the grave, and joyful expectations of a higher existence, these were now his sensations. The fair form of the Angel of Death, the exalted view of a better world, which had fired the lofty-minded youth to compose his sacred hymns, these now hovered round the head of the aged dying saint. In the 12th canto of the Messiah, he has sung the happy close of a virtuous life with unparalleled grandeur of description. Such Christian triumph attended him in the hard struggles of dissolution, which grew more painful on a nearer approach. In the last and severest conflict he raised himself on his couch, folded his hands, and with uplifted eyes pronounced the sacred words so finely illustrated in one of his Odes. 'Can a woman forget her child, that she should not have pity on the fruit of her womb? Yes, she may forget, but I will not forget thee!' The struggle was now over, he fell into a gentle slumber, and awoke no more!" Smith's Memoirs of Klopstock, p. 32, 34.

Klopstock's poetry is marked by exuberance of imagination and of sentiment. His sublimity, which is nearly unparalleled, carries his readers above themselves into new regions which the poet has created for them. The author of the Messiah doubtless ranks among the highest class of poets, and has justly attained the appellation of the Milton of Germany. His odes and lyric poems are much admired by all readers of correct and pure taste; and his dramatic works display great force and dignity, but seem better adapted to the closet than the theatre. He was also an admirable prose writer, as is fully proved by his Grammatical Dialogues; and by his letters, many of which are exquisitely tender and delicate. He had not the vivacity of Burns or of Cowper, in his epistolary compositions; but he abhorred every thing like the too frequent impurity of the former, while in sweetness and dignity he often excelled the latter. In short, he deserves to be celebrated, not only as a poet of first rate genius; but as one who avoided the fatal errors for which genius is but too often urged as an apology: for Klopstock was also a most ardent friend, affectionate husband, amiable man, and sincere Christian; and on these accounts we have thought him entitled to a wider space in our pages than we should otherwise have been inclined to assign him.

To KNAB. *v. a.* (*knappen*, Dutch.) To bite; to bite something brittle (*L'Estrange*).

To KNA'BBLE. *s.* (from *knab.*) To bite idly, or wantonly; to nibble (*Brown*).

KNACK. *s.* (cnapinge, skill, Saxon.) 1. A little machine; a petty contrivance; a toy (*Shakspeare*). 2. A readiness; an habitual facility; a lucky dexterity (*Ben Jonson*). 3. A nice trick (*Pope*).

To KNACK. *v. n.* (from the noun.) To make a sharp quick noise, as when a stick breaks.

KNA'CKER. *s.* (from *knack.*) 1. A maker of small work (*Mortimer*). 2. A ropemaker (*Ainsworth*).

KNAG. *s.* (*knag*, a wart, Dutch.) A hard knot in wood.

KNA'GGY. *a.* (from *knag.*) Knotty; set with hard rough knots.

KNAP. *s.* (*cnap*, Welsh; cnæp, Saxon.) A protuberance; a swelling prominence (*Bacon*).

To KNAP. *v. a.* (*knappen*, Dutch.) 1. To bite; to break short (*Common Prayer*). 2. (*knaap*, Erse.) To strike so as to make a sharp noise like that of breaking (*Bacon*).

To KNAP. *v. n.* To make a short sharp noise (*Wiseman*).

KNAPDALE, one of the divisions of Argyleshire in Scotland.

To KNA'PPLE. *v. n.* (from *knap.*) To break off with sharp quick noise (*Ainsworth*).

KNAPSACK, (from *knappen*, to eat), in a military sense, a rough leather bag which a soldier carries on his back, and which contains all his necessaries. Square knapsacks are most convenient; and should be made with a divi-

sion to hold the shoes, black-ball and brushes, separate from the linen. White goat-skins are the best.

KNAPTON (George), an English portrait painter in crayons, was the scholar of Richardson, and surveyor and keeper of the king's pictures. He died at Kensington in 1778, aged 80.

KNAPWEED, in botany. See CENTAUREA.

KNARE. *s.* (*knor*, German.) A hard knot.

KNARESBOROUGH, a town in the West Riding of Yorkshire, distant 199 miles from London, is an ancient borough by prescription, called by foreigners *the Yorkshire Spa*. It is almost encompassed by the river Nid, which issues from the bottom of Craven-hills; and had a priory, with a castle, long since demolished, on a craggy rock, whence it took the name. The town is about nine furlongs in length; and the parish is famous for several medicinal springs near each other, and yet of different qualities. See HARROGATE.

The dropping or petrifying well is romantically situated by the side of the river, opposite the ruins of the castle; it is the most noted petrifying spring in England; the water drops from a spongy rock. The ground which receives the water before it joins the well is for 12 yards long become a solid rock. From the well it runs into the Nid, where the spring water has made a rock that stretches some yards into the river. The adjacent fields are noted for liquorice, and a soft yellow marle, which is rich manure. The town is governed by a bailiff. Its baths are not so much frequented since Scarborough Spa came in vogue. It has a good market and six fairs. Here are stone bridges over the river; and several interesting remains of antiquity, as Sir Robert's Chapel, &c.

KNAVE, an old Saxon word, which had at first a sense of simplicity and innocence, for it signified a *boy*: Sax. *cnapa*, whence a *knave-child*, i. e. a boy, distinguished from a girl, in several old writers; afterwards it was taken for a servant-boy, and at length for any servant-man. Also it was applied to a minister or officer that bore the shield or weapon of his superior; as *field-knapa*, whom the Latins called *armiger*, and the French *escuyer*, 14 Edw. III. c. 3. And it was sometimes of old made use of as a titular addition; as *Joannes C. filius Wilhelmi C. de Derby, knave*, &c. 22 Hen. VII. c. 37. The word is now perverted to the hardest meaning, viz. *a false deceitful fellow*.

KNAVE, on the cards. See CARDS.

KNA'VERY. *s.* (from *knave*.) 1. Dishonesty; tricks; petty villany (*Dryd.*). 2. Mischievous tricks or practices (*Shakspeare*).

KNA'VISH. *a.* (from *knave*.) 1. Dishonest; wicked; fraudulent (*Pope*). 2. Waggish; mischievous (*Shakspeare*).

KNA'VISHLY. *ad.* 1. Dishonestly; fraudulently. 2. Waggishly; mischievously.

KNAUTIA. In botany, a genus of the class tetrandria, order monogynia. Common calyx oblong simple, five or ten-flowered, proper, simple superior; corollets irregular: receptacle naked. Four species: annuals of the Levant, with red or bluish flowers.

To KNEAD. *v. a.* (cnædan, Saxon.) To beat or mingle any stuff or substance (*Donne*).

KNE'ADINGTROUGH. *s.* (*knead* and *trough*.) A trough in which the paste of bread is worked together (*Exodus*).

KNEADING, the act of pressing and mixing with the hand, or any instrument better calculated to produce an intimate union of its parts, any kind of moist earth, clay, or dough. The term however is most usually applied to the latter substance as practised by the bakers, who, in undertaking the mixture of flour into bread in a large way, find it necessary to use a wooden implement or lever, which being fastened at one end by a moveable hinge, is worked up and down so as to press and knead the dough previous to its being formed into loaves. This machine however is but ill adapted for the purpose; a more ingenious one, first described in the Transactions of the Patriotic Society at Milan, is described in the second volume of Gregory's Mechanics.

KNEE. *s.* (cneop, Saxon.) 1. The joint where the leg is joined to the thigh. See ANATOMY, GENU, and PATELLA. 2. A piece of timber growing crooked, and so cut that the trunk and branch make an angle (*Moxon*).

To KNEE. *v. a.* (from the noun.) To supplicate by kneeling (*Shakspeare*).

KNEE, a crooked piece of timber, having two branches or arms, and generally used to connect the beams of a ship with her sides or timbers. The branches of the knees form an angle of greater or smaller extent, according to the mutual situation of the pieces which they are designed to unite. One branch is securely bolted to one of the deck-beams, and the other in the same manner strongly attached to a corresponding timber in the ship's side. Besides the great utility of knees in connecting the beams and timbers into one compact frame, they contribute greatly to the strength and solidity of the ship, in the different parts of her frame to which they are bolted, and thereby enable her with great firmness to resist the effects of a turbulent sea.

KNEE-HOLM, KNEE-HOLLY. See RUSCUS.

KNEED. *a.* Having knees.

KNEED, or KNEE-JOINTED, in botany. See GENICULATE.

KNE'EDEEP. *a.* (*knee* and *deep*.) 1. Rising to the knees. 2. Sunk to the knees (*Dry.*).

To KNEEL. *v. n.* (from *knee*.) To perform the act of genuflexion; to bend the knee (*Shakspeare*).

KNE'EPAN. *s.* (*knee* and *pan*.) A little round bone at the knee. See PATELLA.

KNE'ETRIBUTE. *s.* (*knee* and *tribute*.) Genuflexion; worship or obeisance shown by kneeling (*Milton*).

KNEL. *s.* (*cnil*, Welsh, a funeral pile; cnyllan, to ring, Saxon.) The sound of a bell rung at a funeral (*Cowley*).

KNELLER (Sir Godfrey), a painter, whose fame is well established in these kingdoms.

He was born at Lubeck in 1648; and received his first instructions in the school of Rembrandt, but became afterwards a disciple of Ferdinand Bol. When he had gained as much knowledge as that school afforded him, he travelled to Rome, where he fixed his particular attention on Titian and the Caraccii. He afterwards visited Venice, and distinguished himself so effectually in that city by his historical pictures and portraits of the noble families there, that his reputation became considerable in Italy. By the advice of some friends he came at last to England, where it was his good fortune to gain the favour of the duke of Monmouth: by his recommendation, he drew the picture of King Charles II. more than once; who was so taken with his skill in doing it, that he used to come and sit to him at his house in Covent-garden piazza. The death of Sir Peter Lely left him without a competitor in England, and from that time his fortune and fame were thoroughly established. No painter could have more incessant employment, and no painter could be more distinguished by public honour. He was state-painter to Charles II. James II. William III. queen Anne, and George I. equally esteemed and respected by them all: the emperor Leopold made him a knight of the Roman empire, and king George I. created him a baronet. Most of the nobility and gentry had their likenesses taken by him, and no painter excelled him in a sure outline, or in the graceful disposition of his figures: his works were celebrated by the best poets in his time. He built himself an elegant house at Whitton near Hampton-court, where he spent the latter part of his life; and died in 1726.

KNEW. The preterit of *know*.

KNIFE. *s.* plur. *knives*. (cniꝼ, Saxon.) An instrument edged and pointed, wherewith meat is cut, and animals killed. Knives are said to have been first made in England in 1563, by one Matthews, on Fleet bridge, London. See also FORK.

KNIGHT, *eques*, among the Romans, a person of the second degree of nobility, following immediately that of the senators. See EQUESTRIAN ORDER, and EQUITES.

KNIGHT, or *Cneght* (Germ.) in feodal history, was originally an appellation or title given by the ancient Germans to their youth after being admitted to the privileges of bearing arms. The passion for arms among the Germanic states, as described by Dr. Stuart in his View of Society in Europe, was carried to extremity. It was amidst scenes of death and peril that the young were educated: it was by valour and feats of prowess that the ambitious signalized their manhood. All the honours they knew were allotted to the brave. The sword opened the path to glory. It was in the field that the ingenious and the noble flattered most their pride, and acquired an ascendancy. The strength of their bodies, and the vigour of their counsels, surrounded them with warriors, and lifted them to command.

But, among these nations, when the individual felt the call of valour, and wished to try his strength against an enemy, he could not of his own authority take the lance and the javelin. The admission of their youth to the privilege of bearing arms, was a matter of too much importance to be left to chance or their own choice. A form was invented by which they were advanced to that honour.

The council of the district, or of the canton to which the candidate belonged, was assembled. His age and his qualifications were inquired into; and if he was deemed worthy of being admitted to the privileges of a soldier, a chieftain, his father or one of his kindred adorned him with a shield and the lance. In consequence of this solemnity, he prepared to distinguish himself; his mind opened to the cares of the public; and the domestic concerns, or the offices of the family from which he had sprung, were no longer the objects of his attention. To this ceremony, so simple and so interesting, the institution of knighthood is indebted for its rise.

Knighthood, however, as a system, known under the denomination of Chivalry, is to be dated only from the 11th century. All Europe being reduced to a state of anarchy and confusion on the decline of the house of Charlemagne, every proprietor of a manor or lordship became a petty sovereign; the mansion-house was fortified by a moat, defended by a guard, and called a castle. The governor had a party of 700 or 800 men at his command; and with these he used frequently to make excursions, which commonly ended in a battle with the lord of some petty state of the same kind, whose castle was then pillaged, and the women and treasures borne off by the conqueror. During this state of universal hostility, there were no friendly communications between the provinces, nor any high roads from one part of the kingdom to another: the wealthy traders, who then travelled from place to place with their merchandise and their families, were in perpetual danger; the lord of almost every castle extorted something from them on the road; and at last, some one more rapacious than the rest, seized upon the whole of the cargo, and bore off the women for his own use.

Thus castles became the warehouses of all kinds of rich merchandise, and the prisons of the distressed females whose fathers or lovers had been plundered or slain, and who being therefore seldom disposed to take the thief or murderer into favour, were in continual danger of a rape.

But as some are always distinguished by virtue in the most general defection, it happened that many lords insensibly associated to repress these sallies of violence and rapine, to secure property, and protect the ladies. Among these were many lords of great fiefs; and the association was at length strengthened by a solemn vow, and received the sanction of a religious ceremony. As the first knights were men of the highest rank, and the largest possessions, such having most to lose, and the least temptation to steal, the fraternity was regarded with

a kind of reverence, even by those against whom it was formed. Admission into the order was deemed the highest honour; many extraordinary qualifications were required in a candidate, and many new ceremonies were added at his creation. After having fasted from sun-rise, confessed himself, and received the sacrament, he was dressed in a white tunic, and placed by himself at a side table, where he was neither to speak, to smile, nor to eat; while the knights and ladies, who were to perform the principal parts of the ceremony, were eating, drinking, and making merry at the great table. At night his armour was conveyed to the church where the ceremony was performed; and here having watched it till the morning, he advanced with his sword hanging about his neck, and received the benediction of the priest. He then kneeled down before the lady who was to put on his armour, who being assisted by persons of the first rank, buckled on his spurs, put an helmet on his head, and accoutred him with a coat of mail, a cuirass, bracelets, cuisses and gauntlets.

Being thus armed cap-a-pee, the knight who dubbed him struck him three times over the shoulder with the flat side of his sword, in the name of God, St. Michael, and St. George. He was then obliged to watch all night in all his armour, with his sword girded, and his lance in his hand. From this time the knight devoted himself to the redress of those wrongs which "patient merit of the unworthy takes;" to secure merchants from the rapacious cruelty of banditti, and women from ravishers, to whose power they were, by the particular confusion of the times, continually exposed.

From this view of the origin of chivalry, it will be easy to account for the castle, the moat, and the bridge, which are found in romances; and as to the dwarf, he was a constant appendage to the rank and fortune of those times, and no castle therefore could be without him. The dwarf and the buffoon were then introduced to kill time, as the card-table is at present. It will also be easy to account for the multitude of captive ladies whom the knights, upon seizing a castle, set at liberty; and for the prodigious quantities of useless gold and silver vessels, rich stuffs, and other merchandise, with which many apartments in these castles are said to have been filled.

The principal lords who entered into the confraternity of knights used to send their sons to each other to be educated, far from their parents, in the mystery of chivalry. These youths, before they arrived at the age of 21, were called *bachelors*, or *bas chevaliers*, inferior knights, and at that age were qualified to receive the order.

So honourable was the origin of an institution, commonly considered as the result of caprice and the source of extravagance; but which, on the contrary, rose naturally from the state of society in those times, and had a very serious effect in refining the manners of the European nations. Valour, humanity, courtesy, justice, honour, were its characteristics: and to these were added religion; which, by infusing a large portion of enthusiastic zeal, carried them all to a romantic excess, wonderfully suited to the genius of the age, and productive of the greatest and most permanent effects both upon policy and manners. War was carried on with less ferocity, when humanity, no less than courage, came to be deemed the ornament of knighthood, and knighthood a distinction superior to royalty, and an honour which princes were proud to receive from the hands of private gentlemen: more gentle and polished manners were introduced, when courtesy was recommended as the most amiable of knightly virtues, and every knight devoted himself to the service of a lady: violence and oppression decreased, when it was accounted meritorious to check and to punish them: a scrupulous adherence to truth, with the most religious attention to fulfil every engagement, but particularly those between the sexes as more easily violated, became the distinguishing character of a gentleman, because chivalry was regarded as the school of honour, and inculcated the most delicate sensibility with respect to that point; and valour seconded by so many motives of love, religion, and virtue, became altogether irresistible.

That the spirit of chivalry sometimes rose to an extravagant height, and had often a pernicious tendency, must however be allowed. In Spain, under the influence of a romantic gallantry, it gave birth to a series of wild adventures which have been deservedly ridiculed: in the train of Norman ambition, it extinguished the liberties of England, and deluged Italy in blood; and at the call of superstition, and as the engine of papal power, it desolated Asia under the banner of the cross. But these ought not to be considered as arguments against an institution laudable in itself, and necessary at the time of its foundation: and those who pretend to despise it, the advocates of ancient barbarism and ancient rusticity, ought to remember, that chivalry not only first taught mankind to carry the civilities of peace into the operations of war, and to mingle politeness with the use of the sword; but roused the soul from its lethargy, invigorated the human character even while it softened it, and produced exploits which antiquity cannot parallel. Nor ought they to forget, that it gave variety, elegance, and pleasure to the intercourse of life, by making woman a more essential part of society; and is therefore intitled to our gratitude, though the point of honour, and the refinements in gallantry, its more doubtful effects, should be excluded from the improvement of modern manners. For,

To illustrate this topic more particularly, we may observe, that women, among the ancient Greeks and Romans, seem to have been considered merely as objects of sensuality, or of domestic conveniency: they were devoted to a state of seclusion and obscurity, had few attentions paid them, and were permitted to take as little share in the conversation as in the general

commerce of life. But the northern nations, who paid a kind of devotion to the softer sex, even in their native forests, had no sooner settled themselves in the provinces of the Roman empire, than the female character began to assume new consequence. Those fierce barbarians, who seemed to thirst only for blood, who involved in one undistinguishing ruin the monuments of ancient grandeur and ancient ingenuity, and who devoted to the flames the knowledge of ages, always forbore to offer any violence to the women. They brought along with them the respectful gallantry of the north, which had power even to restrain their savage ferocity; and they introduced into the west of Europe a generosity of sentiment, and a complaisance towards the ladies, to which the most polished nations of antiquity were strangers.—These sentiments of generous gallantry were fostered by the institution of chivalry, which lifted woman yet higher in the scale of life. Instead of being nobody in society, she became its *primum mobile.* Every knight devoting himself to danger, declared himself the humble servant of some lady, and that lady was often the object of his love. Her honour was supposed to be intimately connected with his, and her smile was the reward of his valour: for her he attacked, for her he defended, and for her he shed his blood. Courage animated by so powerful a motive, lost sight of every thing but enterprise: incredible toils were cheerfully endured, incredible actions were performed, and adventures seemingly fabulous were more than realised. The effect was reciprocal. Women, proud of their influence, became worthy of the heroism which they had inspired: they were not to be approached but by the high-minded and the brave; and men then could only be admitted to the bosom of the chaste fair, after proving their fidelity and affection by years of perseverance and of peril.

Again, as to the change which took place in the operations of war, it may be observed, that the perfect hero of antiquity was superior to fear, but he made use of every artifice to annoy his enemy: impelled by animosity and hostile passion, like the savage in the American woods, he was only anxious of attaining his end, without regarding whether fraud or force were the means. But the true knight or modern hero of the middle ages, who seems in all his rencounters to have had his eye on the judicial combat or judgment of God, had an equal contempt for stratagem and danger. He disdained to take advantage of his enemy: he desired only to see him, and to combat him upon equal terms, trusting that heaven would declare in behalf of the just; and as he professed only to vindicate the cause of religion, of injured beauty, or oppressed innocence, he was further confirmed in his enthusiastic opinion by his own heated imagination. Strongly persuaded that the decision must be in his favour, he fought as if under the influence of divine inspiration rather than of military ardour. Thus the system of chivalry, by a singular combination of manners, blended the heroic and sanctified characters, united devotion and valour, zeal and gallantry, and reconciled the love of God and of the ladies.

Chivalry flourished most during the time of the croisades. From these holy wars it followed, that new fraternities of knighthood were invented: hence the knights of the Holy Sepulchre, the Hospitallers, Templars, and an infinite number of religious orders. Various other orders were at length instituted by sovereign princes: the Garter, by Edward III. of England; the Golden Fleece, by Philip the Good, duke of Burgundy; and St. Michael, by Louis XI. of France. From this time ancient chivalry declined to an empty name; when sovereign princes established regular companies in their armies, knights-bannerets were no more, though it was still thought an honour to be dubbed by a great prince or victorious hero; and all who professed arms without knighthood assumed the title of esquire.

There is scarce a prince in Europe that has not thought fit to institute an order of knighthood; and the simple title of knight, which the kings of Britain confer on private subjects, is a derivation from ancient chivalry, although very remote from its source. See KNIGHT-BACHELOR.

KNIGHT-SERVICE (*servitium militare*, and in law-French *chivalry*); a species of tenure, the origin and nature of which are explained under the articles CHIVALRY, and FEODAL SYSTEM. The knights produced by this tenure differed most essentially from the knights described in the preceding article; though the difference seems not to have been accurately attended to by authors. The one class of knights was of a high antiquity; the other was not heard of till the invention of a fee. The adorning with arms and the blow of the sword made the act of the creation of the ancient knight; the new knight was constituted by an investment in a piece of land. The former was the member of an order of dignity which had particular privileges and distinctions; the latter was the receiver of a feudal grant. Knighthood was an honour; knight-service a tenure. The first communicated splendor to an army; the last gave it strength and numbers. The knight of honour might serve in any station whatever; the knight of tenure was in the rank of a soldier.—It is true at the same time, that every noble and baron were knights of tenure, as they held their lands by knight-service. But the number of fees they possessed, and their creation into rank, separated them widely from the simple individuals to whom they gave out grants of their lands, and who were merely the knights of tenure. It is no less true, that the sovereign, without conferring nobility, might give even a single fee to a tenant; and such vassals *in capite* of the crown, as well as the vassals of single fees from a subject, were the mere knights of tenure. But the former, in respect of their holding from the crown, were to be called to take upon themselves the knight-

hood of honour; a condition in which they might rise from the ranks, and be promoted to offices and command. And as to the vassals *in capite* of the crown who had many fees, their wealth of itself sufficiently distinguished them beyond the state of the mere knights of tenure. In fact, they possessed an authority over men who were of this last description; for, in proportion to their lands were the fees they gave out and the knights they commanded.

By the tenure of knight-service, Judge Blackstone observes, the greatest part of the lands in England were holden, and that principally of the king *in capite*, till the middle of the last century; and which was created, as Sir Edward Coke expressly testifies, for a military purpose, viz. for the defence of the realm by the king's own principal subjects, which was judged to be much better than to trust to hirelings or foreigners. The description here given is that of knight-service proper, which was to attend the king in his wars. There were also some other species of knight-service; so called, though improperly, because the service or render was of a free and honourable nature, and equally uncertain as to the time of rendering as that of knight-service proper, and because they were attended with similar fruits and consequences. Such was the tenure by *grand serjeanty, per magnum servitium*, whereby the tenant was bound, instead of serving the king *generally* in his wars, to do some special honorary service to the king in person; as to carry his banner, his sword, or the like; or be his butler, champion, or other officer at his coronation. It was, in most other respects, like knight-service, only he was not bound to pay aid or escuage; and when tenant by knight-service paid five pounds for a relief on every knight's fee, tenant by grand-serjeanty paid one year's value of his land, were it much or little. Tenure by *cornage*, which was to wind a horn when the Scots or other enemies entered the land, in order to warn the king's subjects, was (like other services of the same nature) a species of grand-serjeanty.

These services, both of chivalry and grand-serjeanty, were all personal, and uncertain as to their quantity or duration. But the personal attendance in knight-service growing troublesome and inconvenient in many respects, the tenants found means of compounding for it, by first sending others in their stead, and in process of time making a pecuniary satisfaction to the lords in lieu of it. This pecuniary satisfaction at last came to be levied by assessments, at so much for every knight's fee; and therefore this kind of tenure was called *scutagium* in Latin, or *servitium scuti*; *scutum* being then a well-known denomination of money: and in like manner it was called, in our Norman French, *escuage*; being indeed a pecuniary instead of a military service. The first time this appears to have been taken was in the 5 Hen. II. on account of his expedition to Tolouse; but it soon came to be so universal, that personal attendance fell quite into disuse. Hence we find in our ancient histories, that, from this period, when our kings went to war, they levied scutages on their tenants, that is, on all the landholders of the kingdom, to defray their expences and to hire troops: and these assessments in the time of Henry II. seem to have been made arbitrarily, and at the king's pleasure. Which prerogative being greatly abused by his successors, it became matter of national clamour; and king John was obliged to consent, by his *magna charta*, that no scutage should be imposed without consent of parliament. But this clause was omitted in his son Henry III.'s charter; where we only find, that scutages or escuage should be taken as they were used to be taken in the time of Henry II.; that is, in a reasonable and moderate manner. Yet afterwards, by statute 25 Edw. I. c. 5. and 6. and many subsequent statutes, it was enacted, that the king should take no aids or tasks but by the common assent of the realm. Hence it is held in our old books, that escuage or scutage could not be levied but by consent of parliament; such scutages being indeed the groundwork of all succeeding subsidies, and the land-tax of later times.

Since, therefore, escuage differed from knight-service in nothing but as a compensation differs from actual service, knight-service is frequently confounded with it. And thus Littleton must be understood, when he tells us, that tenant by homage, fealty, and escuage, was tenant by knight-service: that is, that this tenure (being subservient to the military policy of the nation) was respected as a tenure in chivalry. But as the actual service was uncertain, and depended upon emergencies, so it was necessary that this pecuniary compensation should be equally uncertain, and depend on the assessments of the legislature suited to those emergencies. For, had the escuage been a settled invariable sum, payable at certain times, it had been neither more nor less than a mere pecuniary rent; and the tenure, instead of knight-service, would have then been of another kind, called socage.

By the degenerating of knight-service, or personal military duty, into escuage or pecuniary assessments, all the advantages (either promised or real) of the feodal constitutions were destroyed, and nothing but the hardships remained. Instead of forming a national militia composed of barons, knights, and gentlemen, bound by their interest, their honour, and their oaths, to defend their king and country, the whole of this system of tenures now tended to nothing else but a wretched means of raising money to pay an army of occasional mercenaries. In the mean time the families of all our nobility and gentry groaned under the intolerable burthens which (in consequence of the fiction adopted after the conquest) were introduced and laid upon them by the subtlety and finesse of the Norman lawyers. For, besides the scutages to which they were liable in defect of personal attendance, which, however, were assessed by themselves in parliament, they might be called upon by the king or lord

paramount for aids, whenever his eldest son was to be knighted, or his eldest daughter married; not to forget the ransom of his own person. The heir, on the death of his ancestor, if of full age, was plundered of the first emoluments arising from his inheritance, by way of *relief* and *primer seisin*; and if under age, of the whole of his estate during infancy. And then, as sir Thomas Smith very feelingly complains, "when he came to his own, after he was out of wardship, his woods decayed, houses fallen down, stock wasted and gone, lands let forth and ploughed to be barren," to make amends, he was yet to pay half a year's profits as a fine for suing out his livery; and also the price or value of his marriage, if he refused such wife as his lord and guardian had bartered for, and imposed upon him; or twice that value, if he married another woman. Add to this, the untimely and expensive honour of knighthood, to make his poverty more completely splendid. And when, by these deductions, his fortune was so shattered and ruined, that perhaps he was obliged to sell his patrimony, he had not even that poor privilege allowed him, without paying an exorbitant fine for a licence of alienation.

A slavery so complicated and so extensive as this, called aloud for a remedy in a nation that boasted of her freedom. Palliatives were from time to time applied by successive acts of parliament, which assuaged some temporary grievances. Till at length the humanity of king James I. consented, for a proper equivalent, to abolish them all, though the plan then proceeded not to effect; in like manner as he had formed a scheme, and began to put it in execution, for removing the feodal grievance of heritable jurisdictions in Scotland, which has since been pursued and effected by the statute 20 Geo. II. c. 43. King James's plan for exchanging our military tenures seems to have been nearly the same as that which has been since pursued; only with this difference, that by way of compensation for the loss which the crown and other lords would sustain, an annual fee-farm rent should be settled and inseparably annexed to the crown, and assured to the inferior lords, payable out of every knight's fee within their respective seignories. An expedient, seemingly much better than the hereditary excise which was afterwards made the principal equivalent for these concessions. For at length the military tenures, with all their heavy appendages, were destroyed at one blow by the statute 12 Car. II. c. 24. which enacts, "that the court of ward or liveries, and all wardships, liveries, primer seisins, and ousterlemains, values and forfeitures of marriages, by reason of any tenure of the king or others, be totally taken away. And that all fines for alienations, tenures by homage, knights-service, and escuage, and also aids for marrying the daughter or knighting the son, and all tenures of the king *in capite*, be likewise taken away. And that all sorts of tenures, held of the king or others, be turned into free and common socage; save only tenures in frankalmoign, copyholds, and the honorary services (without the slavish part) of grand-serjeanty." A statute which was a greater acquisition to the civil property of this kingdom than even magna charta itself: since that only pruned the luxuriances that had grown out of the military tenures, and thereby preserved them in vigour; but the statute of king Charles extirpated the whole, and demolished both root and branches.

KNIGHTS-ERRANT. During the prevalence of chivalry, the ardour of redressing wrongs seized many knights so powerfully, that, attended by esquires, they wandered about in search of objects whose misfortunes and misery required their assistance and succour. And as ladies engaged more particularly their attention, the relief of unfortunate damsels was the achievement they most courted. This was the rise of knights-errant, whose adventures produced romance. These were originally told as they happened. But the love of the marvellous came to interfere; fancy was indulged in her wildest exaggerations; and poetry gave her charms to the most monstrous fictions, and to scenes the most unnatural and gigantic. See KNIGHT.

KNIGHT-BACHELOR. See BACHELOR.

KNIGHT-BARONET. See BARONET.

KNIGHTS OF THE SHIRE, or KNIGHTS OF PARLIAMENT, are two gentlemen of worth, chosen on the king's writ in *pleno comitatu*, by such of the freeholders of every county as can expend 40s. per annum, to represent such county in parliament. These, when every man who held a knight's fee *in capite* of the crown was customarily constrained to be a knight, were of necessity to be *milites gladio cincti*, for so the writ runs to this day; but now custom admits esquires to be chosen to this office. They must have at least 500l. per annum; and their expences are to be defrayed by the county, though this be seldom now required.

KNIGHT-MARSHAL, an officer in the king's household, who has jurisdiction and cognizance of any transgression within the king's household and verge; as also of contracts made there, whereof one of the house is party.

KNIGHTS, in a ship, two short thick pieces of wood, commonly carved like a man's head, having four shivers in each, three for the halyards, and one for the top to run in: one of them stands fast bolted on the beams abaft the fore-mast, and is therefore called the *fore-knight*; and the other, standing abaft the main-mast, is called the *main-knight*.

To KNIGHT. *v. a.* (from the noun.) To create one a knight (*Wotton*).

KNI'GHTLY. *a.* (from *knight*.) Befitting a knight; beseeming a knight (*Sidney*).

KNI'GHTHOOD. *s.* (from *knght*.) The character or dignity of a knight (*Ben Jonson*).

KNI'GHTLESS. *a.* (from *knight*.) Unbecoming a knight: obsolete (*Spenser*).

To KNIT. *v. a.* preterit *knit*, or *knitted*. (cnittan, Saxon.) 1. To make or unite by texture without a loom (*Waller*). 2. To tie

Shakspeare). 3. To join; to unite (*Wiseman*). 4. To contract (*Addison*). 5. To tie up (*Acts*).

To KNIT. *v. n.* 1. To weave without a loom (*Dryden*). 2. To join; to unite: not used (*Shakspeare*).

KNIT. *s.* (from the verb.) Texture (*Shakspeare.*)

KNITTELFELDT, a town of Germany, in the duchy of Stiria, on the river Muehr: twenty miles S.W. Pruck, and seventy-eight S.W. Vienna. Lon. 32. 43 E. Ferro. Lat. 47. 19 N.

KNI'TTER. *s.* (from *knit.*) One who weaves or knits (*Shakspeare*).

KNI'TTINGNEEDLE. *s.* (*knit* and *needle.*) A wire which women use in knitting (*Arbuthnot*).

KNI'TTLE. *s.* (from *knit.*) A string that gathers a purse round (*Ainsworth*).

KNITTLINGEN, a town of Germany, in the circle of Swabia, and duchy of Wurtemberg; the birth-place of Faust, one of the first printers: twenty-two miles S. Heidelberg, and nineteen N.W. Stuttgart.

KNOB. *s.* (*knoop*, Dutch.) A protuberance; any part bluntly rising above the rest (*Ray*).

KNO'BBED. *a.* (from *knob.*) Set with knobs; having protuberances (*Grew*).

KNO'BBINESS. *s.* (from *knobby.*) The quality of having knobs.

KNO'BBY. *a.* (from *knob.*) 1. Full of knobs. 2. Hard; stubborn (*Howel*).

To KNOCK. *v. n.* (cnucian, Saxon.) 1. To clash; to be driven suddenly together (*Bentley*). 2. To beat, as at a door for admittance (*Dryden*). 3. *To* KNOCK *under.* A common expression, denoting that a man yields or submits.

To KNOCK. *v. a.* 1. To affect or change in any respect by blows (*Pope*). 2. To dash together; to strike; to collide with a sharp noise (*Rowe*). 3. *To* KNOCK *down.* To fell by a blow. 4. *To* KNOCK *on the head.* To kill by a blow; to destroy (*South*).

KNOCK. *s.* (from the verb.) 1. A sudden stroke; a blow (*Brown*). 2. A loud stroke at a door for admission (*Dryden*).

KNO'CKER. *s.* (from *knock.*) 1. He that knocks. 2. The hammer which hangs at the door for strangers to strike (*Pope*).

KNOCTOPHER, a borough and market town of Ireland, in the county of Kilkenny and province of Leinster, sixty-three miles from Dublin. It returns two members to parliament; patronage in the families of Langrishe and Ponsonby.

To KNOLL. *v. a.* (from *knell.*) To ring the bell, generally for a funeral (*Shakspeare*).

To KNOLL. *v. n.* To sound as a bell (*Shakspeare*).

KNOLL. *s.* A little hill (*Ainsworth*).

KNOP. *s.* (a corruption of *knap.*) Any tufty top (*Ainsworth*).

KNOT. *s.* (cnotta, Saxon.) 1. A complication of a cord or string not easy to be disentangled (*Addison*). 2. Any figure of which the lines frequently intersect each other (*Prior*). 3. Any bond of association or union (*Shakspeare*). 4. A hard part in a piece of wood caused by the protuberance of a bough, and consequently by a transverse direction of the fibres. A joint in an herb (*Wisdom*). 5. Difficulty; intricacy (*South*). 6. Any intrigue, or difficult perplexity of affairs (*Dryden*). 7. A confederacy; an association; a small band (*Ben Jonson*). 8. A cluster; a collection (*Dryden*).

To KNOT. *v. a.* (from the noun.) 1. To complicate in knots (*Sedley*). 2. To entangle; to perplex. 3. To unite (*Bacon*).

To KNOT. *v. n.* 1. To form buds, knots, or joints in vegetation (*Mortimer*). 2. To knit knots for fringes.

KNOT, in ornithology. See TRINGA.

KNOT. Nodus. In botany. A protuberant joint in the stem of some plants, particularly in corn and grasses. An admirable provision to strengthen their otherwise weak hollow culms.

KNOT-GRASS. In botany. See POLYGONUM.

KNOTLESS. Enodis. In botany. Without knots. Continuus absque articulis. Applied to a stem. In this application there is a confusion between nodus and articulus, and the latter is put for the knot itself; whereas in in another place Linnéus puts it for the space between the knots. See JOINT.

KNOTTED, or KNOTTY. Nodosus. Having knots or swelling joints. The terms articulate, geniculate, and nodose, do not seem to be well distinguished by Linnéus. The first appears to mean jointed in general; the last, jointed with a swelling or protuberance. The difference between this and the second has been already explained under GENICULATE.

KNO'TTINESS. *s.* (from *knotty.*) Fulness of knots; unevenness; intricacy (*Peacham*).

KNO'TTY. *a.* (from *knot.*) 1. Full of knots (*Shakspeare*). 2. Hard; rugged (*Rowe*). 3. Intricate; perplexed; difficult; embarrassed (*Bacon*).

KNOUT, the name of a punishment inflicted in Russia, with a kind of whip called knout, and made of a long strap of leather prepared for this purpose. With this whip the executioners dexterously carry off a slip of skin from the neck to the bottom of the back laid bare to the waist, and, repeating their blows, in a little while rend away all the skin off the back in parallel strips. In the common knout the criminal receives the lashes suspended on the back of one of the executioners: but in the great knout, which is generally used on the same occasions as racking on the wheel in France, the criminal is raised into the air by means of a pulley fixed to the gallows, and a cord fastened to the two wrists tied together; a piece of wood is placed between his two legs also tied together, and another of a crucial form under his breast. Sometimes his hands are tied behind over his back; and when he is pulled up in this position, his shoulders are dislocated.

To KNOW. *v. a.* preter. I *knew*, I have *known.* (cnapan, Saxon.) 1. To perceive with

certainty, whether intuitive or discursive (*Locke*). 2. To be informed; to be taught (*Milton*). 3. To distinguish (*Locke*). 4. To recognise (*Milton*). 5. To be no stranger to (*Shakspeare*). 6. To converse with another sex (*Genesis*). 7. To see with approbation (*Hosea*).

To KNOW. *v. n.* 1. To have clear and certain perception; not to be doubtful (*Acts*). 2. Not to be ignorant (*Bacon*). 3. To be informed (*Boyle*). 4. *To* KNOW *for.* To have knowledge of (*Shakspeare*). 5. *To* KNOW *of.* To take cognisance of (*Shakspeare*).

KNO'WABLE. *a.* (from *know*). Cognoscible; possible to be discovered or understood (*Bentley*).

KNO'WER. *s.* (from *know.*) One who has skill or knowledge (*Glanville*).

KNO'WING. *a.* (from *know.*) 1. Skilful; well instructed; remote from ignorance (*Boyle*). 2. Conscious; intelligent (*Blackmore*).

KNO'WING. *s.* (from *know.*) Knowledge. (*Shakspeare*).

KNO'WINGLY. *ad.* (from *knowing.*) With skill; with knowledge (*Atterbury*).

KNO'WLEDGE. *s.* (from *know.*) 1. Certain perception; indubitable apprehension (*Locke*). 2. Learning; illumination of the mind (*Shakspeare*). 3. Skill in any thing (*Kings*). 4. Acquainted with any fact or person (*Sidney*). 5. Cognisance; notice (*Ben Jonson*). 6. Information; power of knowing (*Sidney*).

KNOWLEDGE, according to Mr. Locke, consists in the perception of the connection and agreement, or disagreement and repugnancy of our ideas; and so it stands contradistinguished from ignorance Whatever comes short of intuition and demonstration, is but faith or opinion, not knowledge. As we are invincibly conscious to ourselves of a different perception, when we look on the sun in the day, and think on it by night, we may add to the two former sorts of knowledge this also of the existence of particular external objects by that consciousness we have of the actual entrance of ideas from them; so that there is a third degree of knowledge, which may be called sensitive.

Knowledge also may be usefully distinguished into three kinds; historical, philosophical, and mathematical.

Historical knowledge, is merely the knowledge of facts, or of what is or happens in the material world, or within our own minds. Thus, that the sun rises and sets, that trees bud in the spring, that we remember, will, &c., are instances of historical knowledge.

Philosophical knowledge, is the knowledge of the reasons of things, or of what is or happens. Thus he has a philosophical knowledge of the motion of rivers, who can explain how it arises from the declivity of the bottom, and from the pressure which the lower part of the water sustains from the upper. So likewise the shewing how, and by what reason, desire or appetite arises from the perception or imagination of its object, would be philosophical knowledge.

Mathematical knowledge, is the knowledge of the quantity of things, that is, of their proportions or ratios to some given measure. Thus he who knows the proportion of the meridian heat of the sun at the summer solstice to its meridian heat at the winter solstice, might so far be said to have a mathematical knowledge of the sun's heat. So likewise he has a mathematical knowledge of the motion of a planet in its orbit, who can distinctly shew how, from the quantity of the impressed and centripetal force, the velocity of the planet is produced; and how, from the action of this double force, the elliptical figure of the orbit arises.

These three kinds of knowledge differ evidently, it being one thing to know that a thing is; another, the reason why it is; and a third, to know its quantity or measure.

It is also evident, that historical knowledge, though extensively useful, and the foundation of the rest, is the lowest degree of human knowledge. Those who aim at the greatest certainty ought to join mathematical with philosophical knowledge. Nothing can more evidently shew that an effect arises from a certain cause, than the knowledge that the quantity of the effect is proportional to the force of the cause. Besides, there are many things in nature, the reasons of which depending on certain figures or quantities, are not assignable but from mathematical principles.

KNOWLEDGE (Degrees of.) As to the different degrees, or clearness of our knowledge, it seems to lie in the different way which the mind has of perceiving the agreement or disagreement of any of its ideas. When the mind perceives this agreement or disagreement of two ideas immediately by themselves, without the intervention of any other, we may call it intuitive knowledge; in which case the mind perceives the truth, as the eye doth light, only by being directed towards it. Thus the mind perceives that white is not black; that three are more than two, and equal to one and two. This part of knowledge is irresistible; and, like the bright sun-shine, forces itself immediately to be perceived, as soon as ever the mind turns its view that way. It is on this intuition that all the certainty and evidence of our other knowledge depends: which certainly every one finds to be so great, that he cannot imagine, and therefore cannot require a greater. The next degree of knowledge is, where the mind perceives not this agreement, or disagreement, immediately, or by the juxtaposition, as it were, of the ideas; because those ideas, concerning whose agreement, or disagreement, the inquiry is made, cannot, by the mind, be so put together, as to shew it. In this case, the mind is obliged to discover the agreement, or disagreement, which it searches for, by the intervention of other ideas: and this is that which we call reasoning.

Thus, if we would know the agreement, or disagreement, in bigness, between the three angles of a triangle and two right angles, we cannot do it by an immediate view and comparison of them, because the three angles of a triangle cannot be brought together at once, and compared with any other one or two angles; and so of this the mind has no immediate or intuitive knowledge. But we must find out some other angles, to which the three angles of a triangle have equality; and, finding those equal to two right ones, we come to know the equality of these three angles to two right ones.

Those intervening ideas, which serve to shew the agreement of any two others, are called proofs: and where the agreement, or disagreement, is by this means plainly and clearly perceived, it is called demonstration: and a quickness in the mind to find those proofs, and to apply them right, is that which is called sagacity.

This knowledge, though it be certain, is not so clear and evident as intuitive knowledge; it requires pains and attention, and steady application of mind, to discover the agreement, or disagreement, of the ideas it considers; and there must be a progression by steps and degrees, before the mind can, in this way, arrive at any certainty.

Before demonstration, there was a doubt, which in intuitive knowledge, cannot happen to the mind, that has its faculty of perception left in a degree capable of distinct ideas, no more than it can be a doubt to the eye (that can distinctly see white and black), whether this ink and paper be all of a colour. Now, in every step that reason makes in demonstrative knowledge, there is an intuitive knowledge of that agreement, or disagreement, it seeks, with the next intermediate idea, which it uses as a proof; for, if it were not so, that yet would need a proof, since, without the perception of such agreement, or disagreement, there is no knowledge produced.

By which it is evident, that every step in reasoning, that produces knowledge, has intuitive certainty; which, when the mind perceives, there is no more required, but to remember it, to make the agreement, or disagreement, of the ideas, concerning which we inquire, visible and certain. This intuitive perception of the agreement, or disagreement, of the intermediate ideas in each step and progression of the demonstration, must also be exactly carried in the mind; and a man must be sure, that no part is left out, which, because in long deductions the memory cannot easily retain, this knowledge becomes more imperfect than intuitive, and men often embrace falsehoods for demonstrations.

It has been generally taken for granted, that mathematics alone are capable of demonstrative certainty: but to have such an agreement, or disagreement, as may be intuitively perceived, being, as we imagine, not the privilege of the ideas of number, extension, and figure alone, it may, possibly, be the want of due method and application in us, and not of sufficient evidence in things, that demonstration has been thought to have so little to do in other parts of knowledge. For, in whatever ideas the mind can perceive the agreement, or disagreement, immediately, there it is capable of intuitive knowledge; and, where it can perceive the agreement, or disagreement, of any two ideas, by the intuitive perception of the agreement, or disagreement, they have with any intermediate ideas, there the mind is capable of demonstration, which is not limited to the ideas of figure, number, extension, or their modes.

On this branch of the subject it may be inferred:

1. That we can have no knowledge farther than we have ideas.

2. That we have no knowledge farther than we can have perception of the agreement, or disagreement, of our ideas, either by intuition, demonstration, or sensation.

3. We cannot have an intuitive knowledge, that shall extend itself to all our ideas, and all that we would know about them; because we cannot examine and perceive all the relations they have one to another by juxtaposition, or in immediate comparison one with another. Thus, we cannot intuitively perceive the equality of two extensions, the difference of whose figures makes their parts incapable of an exact immediate application.

4. Our rational knowledge cannot reach to the whole extent of our ideas; because, between two different ideas which we would examine, we cannot always find such proofs, whereby we can connect one to another with an intuitive knowledge in all the parts of the deduction.

5. Sensitive knowledge, reaching no farther than the existence of things actually present to our senses, is yet much narrower than either of the former.

6. From all which it is evident, that the extent of our knowledge comes not only short of the reality of things, but even of the extent of our own ideas. We have the ideas of a square, a circle, and equality; and yet, perhaps, shall never be able to find a circle equal to a square.

The affirmations or negations we make concerning the ideas we have, being reduced by Mr. Locke to these four, viz. identity, coexistence, relation, and real existence, he examines how far our knowledge extends to each of these.

1. As to identity and diversity, our intuitive knowledge is so far extended as our ideas themselves, and there can be no idea in the mind which it does not presently, by an intuitive knowledge, perceive to be what it is, and to be different from any other.

2. As to the agreement or disagreement of our ideas of co-existence, our knowledge herein is very defective, though the greatest and most material part of our knowledge concerning substances consists in it.

As to the powers of substances, which

make a great part of our enquiries about them, our knowledge reaches little further than experience, because they consist in a texture and motion of parts which we cannot by any means come to discover.

3. As to the third sort, the agreement or disagreement of our ideas in any other relation; this is the largest field of knowledge, and it is hard to determine how far it may extend. This part depending on our sagacity in finding intermediate ideas, that may shew the habitudes and relations of ideas, it is difficult to tell when we are at an end in such discoveries.

4. As to the fourth part of knowledge, viz. of the real actual existence of things, we have an intuitive knowledge of our own existence, a demonstrative knowledge of the existence of God, and a sensitive knowledge of the objects that present themselves to our senses. See Existence.

Knowledge (reality of). It is evident, that the mind knows not things immediately, but by the intervention of the ideas it has of them. Our knowledge, therefore, is real only so far as there is a conformity between our ideas, and the reality of things. But how shall we know when our ideas agree with things themselves? It is answered, There are two sorts of ideas, that we may be assured agree with things: these are,

1. Simple ideas, which, since the mind can by no means make to itself, must be the effect of things operating upon the mind in a natural way, and producing therein those perceptions, which, by the will of our Maker, they are ordained and adapted to. Hence it follows, that simple ideas are not fictions of our fancies, but the natural and regular production of things without us, really operating upon us, which carry with them all the conformity our state requires, which is to represent things under those appearances they are fittest to produce in us. Thus the idea of whiteness, as it is in the mind, exactly answers that power which is in any body to produce it there; and this conformity between our simple ideas, and the existence of things, is sufficient for real knowledge.

2. All our complex ideas, except only those of substances, being archetypes of the mind's own making, and not referred to the existence of things, as to their originals, cannot want any conformity necessary to real knowledge; for that which is not designed to represent any thing but itself, can never be capable of a wrong representation. Here the ideas themselves are considered as archetypes, and things are no otherwise regarded than as conformable to them. Thus the mathematician considers the truth and properties belonging to a rectangle, or circle, only as they are ideas in his own mind, which possibly he never found existing mathematically, that is, precisely true; yet his knowledge is not only certain, but real, because real things are no farther concerned, nor intended to be meant by any such propositions, than as things really agree to those archetypes in the mind.

3. But the complex ideas, which we refer to archetypes without us, may differ from them, and so our knowledge about them may come short of being real: and such are our ideas of substances. These must be taken from something, that does or has existed, and not be made up of ideas arbitrarily put together, without any real pattern. Herein, therefore, is founded the reality of our knowledge concerning substances, that all our complex ideas of them must be such, and such only, as are made up of such simple ones as have been discovered to co-exist in nature: and our ideas, being thus true, though not, perhaps, very exact copies, are the subject of real knowledge of them. Whatever ideas we have, the agreement we find they have with others, will be knowledge. If those ideas be abstract, it will be general knowledge; but, to make it real concerning substances, the ideas must be taken from the real existence of things. Wherever, therefore, we perceive the agreement, or disagreement, of our ideas, there is certain knowledge; and wherever we are sure those ideas agree with the reality of things, there is certain, real knowledge.

Knowledge (method of improving or enlarging). It being the received opinion amongst men of letters, that maxims are the foundation of all knowledge, and that sciences are each of them built upon certain præcognita, from whence the understanding is to take its rise, and by which it is to conduct itself in its enquiries in the matters belonging to that science; the beaten road of the schools has been to lay down, in the beginning, one or more general propositions, called principles, as foundations whereon to build the knowledge that was to be had of that subject.

That which gave occasion to this way of proceeding was, the good success it seemed to have in mathematics, which, of all the sciences, have the greatest certainty, clearness, and evidence in them. But, if we consider it, we shall find, that the great advancement and certainty of real knowledge men arrive to in these sciences, was not owing to the influence of those principles, but to the clear, distinct and complete ideas, their thoughts were employed about, and to the relation of equality and excess, so clear between some of them, that they had an intuitive knowledge, and by that a way to discover it in others, and this is without the help of those maxims. For is it not possible for a lad to know that his whole body is bigger than his little finger, but by virtue of this axiom, the whole is bigger than a part; nor be assured of it till he has learned that maxim? Let any one consider which is known first and clearest by most people, the particular instance, or the general rule; and which it is that gives life and birth to the other: these general rules are but the comparing our more general and abstract ideas, which ideas are made by the mind, and have names given them, for the easier dispatch in its reasonings: but knowledge began in the mind, and was founded on particulars, though afterwards,

perhaps, no notice be taken thereof, it being natural for the mind to lay up those general notions, and make the proper use of them, which is to disburden the memory of the cumbersome load of particulars. The way to improve in knowledge is, not to swallow principles with an implicit faith, and without examination, which would be apt to mislead men, instead of guiding them into truth; but to get and fix in our minds clear and complete ideas, as far as they are to be had, and to annex to them proper and constant names: and thus barely by considering our ideas, and comparing them together, observing their agreement, or disagreement, their habitudes and relations, we shall get more true and clear knowledge by the conduct of this one rule, than by taking up principles, and thereby putting our minds into the disposal of others.

We must therefore, if we will proceed as reason advises us, adapt our methods of enquiry to the nature of the ideas we examine, and the truth we search after. General and certain truths are only founded in the habitudes and relations of abstract ideas; therefore a sagacious, methodical application of our thoughts for the finding out these relations, is the only way to discover all, that can with truth and certainty, be put into general propositions. By what steps we are to proceed in these, is to be learned in the schools of the mathematicians, who, from very plain and easy beginnings, by gentle degrees, and a continued chain of reasonings, proceed to the discovery and demonstration of truths, that appear at first sight above human capacity. This may reasonably be said, that if other ideas, that are real as well as nominal essences of their species, were pursued in the way familiar to mathematicians, they would carry our thoughts farther, and with greater evidence and clearness, than probably we are apt to imagine.

In our knowledge of substances, we are to proceed in quite a different method; the bare contemplation of their abstract ideas, which are but nominal essences, must carry us but a very little way in the search of truth and certainty: here experience will teach us what reason cannot; and it is by trying alone that we can certainly know what other qualities co-exist with those of our complex idea; for instance, whether that yellow, heavy, fusible body we call gold, be malleable or not, which experience, however it prove in that particular body we examine, makes us not certain that it is so in all or any other yellow, heavy, fusible bodies, but that which we have tried; because it is no consequence, one way or other, from our complex idea. As far as our experience reaches, we may have certain knowledge, and no farther. It is not denied, but that a man accustomed to rational and regular experiments, shall be able to see farther into the nature of bodies, and their unknown properties, than one that is a stranger to them; but this is only judgment; and opinion, not knowledge and certainty.

The ways to enlarge our knowledge, as far as we are capable, seem to be these two: the first is, to get and settle in our minds, as far as we can, clear, distinct, and constant ideas of those things we would consider and know, for it being evident, that our knowledge cannot exceed our ideas, where they are either imperfect, confused or obscure, we cannot expect to have certain, perfect, or clear knowledge. The other art is, of finding out the intermediate ideas, which may shew us the agreement or repugnancy of other ideas, which cannot be immediately compared.

That these two, (and not relying on maxims, and drawing consequences from some general propositions) are the right method of improving our knowledge in the ideas of other modes, besides those of quantity, the consideration of mathematical knowledge will easily inform us; where, first, we shall find, that he, who has not clear and perfect ideas of those angles or figures, of which he desires to know any thing, is utterly thereby incapable of any knowledge about them. Suppose a man not to have an exact idea of a right angle, scalenum, or trapezium, and it is clear, that he will in vain seek any demonstration about them.

And farther, it is evident, that it was not the influence of maxims or principles that led the masters of this science into those wonderful discoveries they have made: let a man of good parts know all the maxims of mathematics ever so well, and contemplate their extent and consequences as much as he pleases, he will, by their assistance, scarce ever come to know, that the square of the hypothenuse in a right-angled triangle, is equal to the squares of the two other sides. This, and other mathematical truths, have been discovered by the thoughts otherwise applied. The mind had other objects, other views before it, far different from those maxims, which men, well enough acquainted with those received axioms, but ignorant of their method who first made those demonstrations, can never sufficiently admire.

Our knowledge, as in other things, so in this also, has so great a conformity with our sight, that it is neither wholly necessary, nor wholly voluntary. Men, who have senses, cannot choose but receive some ideas by them; and, if they have memory, they cannot but retain some of them; and if they have any distinguishing faculty, cannot, but perceive the agreement or disagreement, of some of them, one with another. As he that has eyes, if he will open them by day, cannot but see some objects, and perceive a difference in them; yet he may choose whether he will turn his eyes towards an object, curiously survey it, and observe accurately, all that is visible in it. But what he doth see he cannot see otherwise than he doth; it depends not on his will to see that black, which appears yellow. Just thus it is with our understanding: all that is voluntary in our knowledge, is the employing or with-holding any of our faculties, from this or that sort of objects, and a more or less accurate survey of them; but, they being employed, our will hath

no power to determine the knowledge of the mind one way or another; that is done only by the objects themselves, as far as they are clearly discovered. Thus, he that has got the ideas of numbers, and has taken the pains to compare one, two, or three, to six, cannot choose but know they are equal. He also, that hath the idea of an intelligent, but weak and frail being, made by, and depending on, another, who is eternal, omnipotent, and perfectly wise and good, will as certainly know, that man is to honour, fear, and obey God, as that the sun shines when he sees it. But yet, be those truths ever so certain, ever so clear, he may be ignorant of either or both of them, who will not take the pains to employ his faculties as he should, to inform himself about them.

On this most interesting subject, we would beg to recommend to the younger part of our readers, Watts's Improvement of the Mind, and Locke's Conduct of the Understanding. We have here adopted Locke's theory and his mode of reasoning; not because we think them free from objection, but because in our opinion the principles of metaphysics are as yet too much afloat, to permit us to give any other theory a decided preference. See METAPHYSICS.

To KNO'WLEDGE. *v. a.* (not in use.) To acknowledge; to avow (*Bacon*).

KNOX (John), the Scotch reformer, was born at Giffard in the county of Lothian, in 1505, and educated for the church at St. Andrews. Mr. George Wishart brought him off from popery after he had entered into orders. He now openly preached the doctrines of the reformation without reserve, for which he was greatly persecuted by the Romish clergy. When the castle of St. Andrews was taken by the French, he was carried with the garrison to France, from whence he came to England in 1549. In 1552 he was appointed chaplain to king Edward VI. and he might have had considerable preferment if he would have conformed to the liturgy. When queen Mary came to the throne he went to Geneva, from whence he removed to Frankfort, to be preacher to the English refugees. He left Frankfort in 1555, and returned to his own country, and finding the protestant party increased, he redoubled his efforts through all the kingdom, and that with great success. This brought his life into imminent danger, and, therefore, he once more visited Geneva; and when he was gone the bishops caused sentence of death to be passed upon him for heresy, and his effigy was publicly burnt at Edinburgh. While at Geneva he published some severe pieces against the bishops, and also, against female government. In 1559 he returned home, and found his party so strong, that there was little danger to be any longer apprehended from his enemies; he therefore recommenced his labours with new zeal. He died in November, 1572, and was buried at Edinburgh; several lords attending the funeral. He had two sons, both fellows of St. John's college, Cambridge. Knox wrote a History of the Reformation of Religion in Scotland, folio, and several small tracts and sermons.

The following character of Knox was drawn by Dr. Robertson:—" Zeal, intrepidity, disinterestedness, were virtues that he possessed in an eminent degree. He was acquainted too with the learning cultivated in that age; and excelled in that species of eloquence which is calculated to rouse and to inflame. His maxims, however, were often too severe, and the impetuosity of his temper excessive. Rigid and uncomplying, he shewed no indulgence to the infirmities of others. Regardless of the distinctions of rank and character, he uttered his admonitions with an acrimony and vehemence more apt to irritate than to reclaim; and this often betrayed him into indecent expressions, with respect to queen Mary's person and conduct. Those very qualities, however, which now render his character less amiable, fitted him to be the instrument of Providence for advancing the reformation among a fierce people, and enabled him to face dangers, and to surmount opposition, from which a person of a more gentle spirit would have been apt to shrink back. By an unwearied application to study and to business, as well as by the frequency and fervour of his public discourses, he had worn out a constitution naturally strong. During a lingering illness, he discovered the utmost fortitude; and met the approach of death with a magnanimity inseparable from his character. He was constantly employed in acts of devotion, and comforted himself with those prospects of immortality, which not only preserve good men from desponding, but fill them with exultation in their last moments. The earl of Morton, who was present at his funeral, pronounced his eulogium in a few words, the more honourable for Knox, as they came from one whom he had often censured with peculiar severity. 'Here lies he who never feared the face of man.'"

KNOXIA. In botany, a genus of the class tetrandria, order monogynia. Corol one-petalled, funnel-form; calyx four-leaved, one of the leaflets larger than the rest; seeds two-grooved. Two species; one a native of Ceylon, one of India.

To KNU'BBLE. *v. a.* (*knipler*, Danish.) To beat (*Skinner*).

KNU'CKLE. *s.* (cnucle, Saxon.) 1. The joints of the fingers protuberant when the fingers close (*Garth*). 2. The knee joint of a calf (*Bacon*). 3. The articulation or joint of a plant (*Bacon*).

To KNU'CKLE. *v. n.* (from the noun.) To submit.

KNU'CKLED. *a.* (from *knuckle.*) Jointed (*Bacon*).

KNUFF. *s.* A lout. An old word (*Hayward*).

KNUR. KNURLE. *s.* (*knor*, German.) A knot; a hard substance (*Woodward*).

KOEI-TCHEOU, a province of China, and one of the smallest in the kingdom. On the south it has Quang-si, on the east Houquang, on the north Se-tchuen, and Yun-nan on the west. The whole country is almost a desert, and covered with inaccessible mountains: it may justly be called the Siberia of China. The people who inhabit it are mountaineers, accustomed to independence, and who seem to form a separate nation: they are no less ferocious than the savage animals among which they live.

KOEI-TCHEOU-FOU, a commercial city of China, in the province of Se-tchuen. Its district contains one city of the second class, and nine of the third.

KOEI-YANG, the capital of the province of Koei-tcheou, in China. The remains of temples and palaces still announce its former magnificence. It is 420 miles north-west of Canton.

KŒBRENTERIA. In botany a genus of the class octandria, order monogynia. Calyx five-leaved; corol four-petalled, irregular; nectary four bifid scales; capsule three-celled; the cells two-seeded. One species; a native of China.

KŒMPFER (Engelbert), a German physician and naturalist, was born in Westphalia in 1651, and studied at various places. He became secretary of the embassy sent from Sweden to Persia in 1683: in this journey he had ample opportunities of gratifying his curiosity; and when the ambassador returned, he chose rather to stay in the east, as chief surgeon to the Dutch East India fleet. In this capacity he visited different islands, particularly Japan, of which he published afterwards an excellent account. He returned to Europe in 1693, and settled in his own country, where he died in 1716.

KOENIG (Samuel), a learned philosopher and mathematician, was a Swiss by birth, and came early into eminence by his mathematical abilities. He was professor of philosophy and natural law at Franeker, and afterwards at the Hague, where he became also librarian to the Stadtholder, and to the Princess of Orange; and where he died in 1757.

The Academy of Berlin enrolled him among her members; but afterwards expelled him on the following occasion. Maupertuis, the president, had inserted in the volume of the Memoirs for 1746, a discourse upon the Laws of Motion; which Koenig not only attacked, but also attributed the memoir to Leibnitz. Maupertuis, stung with the imputation of plagiarism, engaged the Academy of Berlin to call upon him for his proof; which Koenig failing to produce, he was struck out of the academy. All Europe was interested in the quarrel which this occasioned between Koenig and Maupertuis. The former appealed to the public; and his appeal, written with the animation of resentment, procured him many friends. He was author of some other works, and had the character of being one of the best mathematicians of the age.

KOENIGIA. In botany a genus of the class triandria, order trigynia. Calyx three-leaved; corolless; seed one, ovate, naked. One species: a native of Iceland, with numerous terminal flowers divided by membraneous bratches.

KOLA, a town of the Russian government of Archangel, capital of Russian Lapland. It has a good harbour on the river Kola, near a bay of the same name in the Frozen Ocean. Lon. 32. 26. E. Lat. 68. 34. N.

KOLYVAN, a government of the Russian empire, comprehending a part of Western Siberia, and formerly included in the government of Tobolsk.

KONED, for *knew* (*Spenser*).

KONGSBERG, a town of Norway, belonging to Denmark, and celebrated for its silver mines, whose produce has been considerably exaggerated by most of the travellers that have published on this subject. The town which stretches on both sides the river Lowe, contains about 1000 houses, and, including the miners, 6000 inhabitants. The mines, which lie about two miles from the town, were first discovered and worked during the reign of Christian IV.

KONIG (George Matthias), a learned German, was born at Altdorf in Franconia, where he was professor of poetry and Greek, and library keeper of the university. He died in 1699, aged 83. His principal work is a Biographical Dictionary in Latin, printed at Altdorf in 1678, 4to.

KONIG (Emanuel), a physician of Basil in Switzerland, who was so greatly esteemed in that country as to be reckoned another Hippocrates. He wrote many medical works, and died in 1731, aged 73.

KONINGSBERG, a town of Poland, and capital of Regal Prussia, with a magnificent palace, in which is a hall 274 feet long and 59 broad without pillars to support it, and a handsome library. It is about five miles in circumference; and including the garrison of 7000 men contains 60,000 inhabitants. The town-house, the exchange, and the cathedral church, are all very fine structures. The tower of the castle is exceeding high, and has 284 steps to go to the top, from whence there is a very distant prospect. There are 18 churches in all; of which 14 belong to the Lutherans, three to the Calvinists, and one to the Papists. It stands on the Pregel, a navigable river which flows from the north-western provinces of Poland, and here falls into the eastern extremity of the Frische Haf, an inlet of the Baltic. No ships drawing more than seven feet water can pass the bar and come up to the town; so that the large vessels anchor at Pillau, a small town on the Baltic, which is the port of Koningsberg; and the merchandise is sent in smaller vessels to this place. Its trade is very considerable.—Koningsberg

contains an university, founded by Albert of Brandenburgh. According to the original endowment there were 40 professors; but their number is now reduced to 16. Each professor receives a salary of about 50l. per annum, which may be increased by private lectures. In 1775, the university contained 800 students, of whom 200 are lodged and boarded at the expence of the crown. There are three public libraries in the town, the royal or university library, the town library, and the Wallenrodt library, so called because it was given by Martien von Wallendrot, in 1650. E. lon. 20. 48. N. lat. 54. 43.

KONIGSTEIN, a town of Upper Saxony, in the territory of Misnia, with an impregnable fort. It is a place of confinement for state prisoners, and is seated on the Elbe, 10 miles south-east of Pyrna, and 10 south-west of Dresden. Lon. 13. 43. E. Lat. 51. 2. N.

Konigstein, a town of Germany, in the archbishopric of Mentz, with a strong fort, 12 miles north-east of Mentz. It surrendered to the French in 1796. Lon. 8. 25. W. Lat. 53. 5. N.

KONIGSTUTER, a town of Germany in the territory of Brunswick Wolfenbuttle, with a celebrated abbey. Lon. 11. 7. E. Lat. 52. 25. N.

KORAN. See Alcoran.

KOREKI, the country of the Koriacs.

KORIACS, a nation of Asia, tributary to the Russians. There are two sorts of Koriacs. Those who are properly called by that name have a fixed residence: the others are wanderers, and are known by the appellation of Raindeer Koriacs. Their flocks are numerous, and they maintain them by conducting them to those cantons that abound with moss. When these pastures are exhausted, they seek for others. In this manner they wander about, encamping under tents of skin, and supporting themselves with the produce of their deer, which are as serviceable for draught to the Koriacs as the dogs are to the Kamtschadales. There is, in many respects, a great resemblance between the fixed and the wandering Koriacs: yet the misunderstanding which subsists among them, causes them to be considered as two different people. Their country, however, is the same, and takes in a vast extent, terminated to the south by Kamtschatka and the gulf of Pengina, to the east by the country of the Oluterians, to the north by that of the Tehoukchis, and to the west by the Tongouses, the Lamouts, and the Yakouts.

KOS, in the Jewish Antiquities, a measure which held the quantity of four cubic inches, and something over. This was the cup of blessing, out of which they drank when they gave thanks after solemn meals, as on the day of the passover.

KOUANIN, in the Chinese language, the name of a tutelary deity of women. The Chinese make great numbers of the figures of this deity in white porcelain, and send them to all parts of the world, as well as keep them in their own houses. The figure represents a woman with a child in her arms. The women, who have no children, pay a sort of adoration to these images, and suppose the deity they represent to be of power to make them fruitful. It has been supposed, by many Europeans, that these images were meant to represent the Virgin Mary, with our Saviour in her arms; but this is an idle opinion; the Chinese having been fond of this figure in all times that we have an account of. The statue always represents a handsome woman, very modestly attired.

KOUCH (Peter), a Dutch painter, was born in 1500. He visited Constantinople, and drew some fine views in the neighbourhood of that city, some of which were afterwards engraved. He afterwards settled at Antwerp, and became principal painter to the emperor Charles V. He died in 1553.

KOULI-khan (Thamas), or Schah Nadir, was not the son of a shepherd, as the authors of the English Biographical Dictionary assert; his father being chief of a branch of the tribe of Affchars, and governor of a fortress erected by that people against the Turks. Upon his father's death, his uncle usurped his government, under the pretext of taking care of it during the minority of Kouli-Khan; or, more properly, young Nadir. Disgust at this affront made him commence adventurer. He entered into the service of Begleberg, governor of Muschada, in the Khorasan; who, discovering in him strong marks of a military genius, promoted him to the command of a regiment of cavalry. In 1720, the Usbec Tartars having made an irruption into the Khorasan with 10,000 men, Beglerberg, whose whole force consisted only of 4000 horse and 2000 infantry called a council of war, in which it was declared imprudent to face the enemy with such an inferior force: but Kouli-Khan, proposed to march against the enemy, and engaged to conduct the expedition, and to be answerable for the success of it. He was accordingly made general; defeated the Tartars, and took their commander prisoner. Hossein Beglerberg received him at his return with marks of distinction; but growing jealous of his rising fame, instead of obtaining him the rank of lieutenant-general of the Khorasan, as he had promised, obtained it for another; which so exasperated Kouli-Khan, that he publicly complained of the governor's ingratitude and perfidy; who thereupon broke him, and ordered him to be punished with the bastinado so severely, that the nails of his great toes fell off. This affront occasioned his flight, and his joining a banditti of robbers (not his stealing his father's or his neighbour's sheep). The rest of his adventures are too numerous to be inserted in this

work. In 1729 he was made general of Persia by Schah Thamas, and permitted to take his name Thamas, and that of Khuli, which signifies slave: his title therefore was, The slave of Thamas; but he was ennobled by the addition of Khan. In 1736, he fomented a revolt against his master, for having made an ignominious peace with the Turks; and having the army at his command, he procured his deposition, and his own advancement to the throne. In 1739 he conquered the Mogul empire; and from this time growing as cruel as he was ambitious, he at length met with the usual fate of tyrants, being assassinated by one of his generals, in league with his nephew and successor, in 1747, aged sixty.

KOUMISS, a sort of wine made in Tartary, where it is used by the natives as their common beverage during the season of it, and often serves them instead of all other food. It is said to be so nourishing and salutary, that the Baschkir Tartars, who towards the end of winter are much emaciated, no sooner return in summer to the use of koumiss, than they become strong and fat.

Dr. Grieve has given in the Edinburgh Transactions, vol. I. p. 181, the recipe for making koumiss, as it was communicated to him by a Russian nobleman.

KRAKEN, the name of a monstrous animal, said to have been seen in the northern seas. A long account of it is given by Bishop Pontoppidan in his Natural History of Norway: but we cannot persuade ourselves to occupy our pages with so incredible a story.

KRAMERIA. In botany a genus of the class tetrandria, order monogynia. Calyx less; corol four-petalled; upper nectary three-parted, lower two-leaved, berry dry, echinate, one-seeded, one species: a South American shrub with alternate-lanceolate leaves, and alternate flowers in terminal racemes.

KRANTZIUS (Albertus,) a native of Hamburgh, and famous historian, who travelled over several parts of Europe, and was made rector of the university of Rostoch in 1482. He went from thence to Hamburgh in 1508, where he was elected dean of the chapter in the cathedral. He did many good services to that church and city; and was so famed for his abilities and prudence, that John king of Denmark and Frederic duke of Holstein did not scruple to make him umpire in a dispute they had with the Ditmarsi. He wrote several good historical works; the most considerable of which is an ecclesiastical history of Saxony, intitled *Metropolis*, in folio; the best edition is that of Francfort. He died in 1517.

KRAUT, or CROUT. See CROUT.

KRUMHORN, or KREMHORN, the name of a portable wind-instrument formerly much in use, the formation and tone of which resembled that of a small cornet. Many organ builders corrupt this word into *Cremona*, and apply it to one of their cornet stops, erroneously supposing that stop to have originally derived that name from its imitation of the tone of the *Cremona* violin. See Stop CREMONA.

KRIGIA. In botany a genus of the class syngenesia, order polygamia æqualis. Receptacle naked; calyx many-leaved, simple; seeds crowned with a five-leaved membrane alternating with as many bristles. One species; a Virginian plant.

KUHNIA. In botany a genus of the class syngenesia, order polygamia æqualis. Receptacle naked; down feathery, sessile; calyx imbricate, cylindrical. Two species: natives of Pennsylvania, with terminal corymbs.

KUHNIUS (Joachim), professor of Greek and Hebrew at Strasburg, was a native of Pomerania, and distinguished himself by some learned works, as editions of Ælian's Various History, Pausanias's Description of Greece, and some original pieces of his own. He died in 1697, aged 50.

KUICK (John van), an historical and portrait painter of Dort, was born in 1530. Having given some offence to the jesuits, they accused him of heresy, and had him burnt to death in 1572.

KUNCKEL (John), a celebrated Saxon chemist, born in the duchy of Sleswick, in 1630. He became chemist to the elector of Saxony, the elector of Brandenburgh, and Charles II. king of Sweden, who gave him the title of counsellor in metals, and letters of nobility, with the surname of Louwensteing. He employed 50 years in chemistry; in which, by the help of the furnace of a glass house which he had under his care, he made several excellent discoveries, particularly of the phosphorus of urine. He died in Sweden in 1702; and left several works, some in German, and others in Latin: among which, that intitled *Observationes Chemicæ*, and the "Art of making Glass," printed at Paris in 1752, are the most esteemed.

KUNCKEL'S *Pyrophorus*. See PYROPHORUS.

KUPFER-NICKEL. In mineralogy. See NICCOLUM.

KURIL or KURILSKI ISLES, extending from N. lat. 51. to 45. which probably once lengthened the peninsula of Kamtchatka before they were convulsed from it, are a series of islands running south from the low promontory Lopatka, between which and Shoomska, the most northerly is only the distance of one league. On the lofty Paramonser, the second in the chain, is a high peaked, mountain, probably volcanic; and on the fourth, called *Araumakutan*, is another volcano. On Uruss there is another; on Storgu there are two; and on Kunatir, or Kanachir, there is one. These three make part of the group which pass under the name of the land of Jeso.

KURTUS. In zoology a genus of the

class pisces, order jugularia. Body carinate on each side; back elevated; gill-membrane with two rays. One species only. Inhabits the Indian Sea; feeds on crabs and testaceous animals; body short, slender, golden, and appearing as if covered with silvery plates. Head large, compressed, obtuse; eyes very large, pupil black, iris, above blue, beneath white; mouth large; jaws with numerous small teeth, the upper something larger, and a little curved; tongue short, cartilaginous; palate smooth; aperture of the gills large, the cover membranaceous; back spotted with orange, with four black spots before the fin; lateral line straight, commencing above the pectoral fin; bent near the head; fins with forked rays; pectoral and ventral, golden, edged with reddish, the rest blueish at the base and yellow towards the edge, the first ray of the dorsal and ventral fins hard; the two first of the anal, spinous.

KUSTER (Ludolf), a very learned writer in the 18th century, was born at Blomberg in Westphalia. When very young, he was upon the recommendation of baron Spanheim appointed tutor to the two sons of the count de Schwerin, prime minister of the king of Prussia, who, upon our author's quitting that station, procured him a pension of 400 livres. He was promised a professorship in the university of Joachim; and till this should be vacant, being then but 25, he resolved to travel. He read lectures at Utrecht; went to England; and from thence to France, where he collated Suidas with three MSS. in the king's library, which furnished him with a great many fragments that had never been published. He was honoured with the degree of doctor by the university of Cambridge, which made him several advantageous offers to continue there: but he was called to Berlin, where he was installed in the professorship promised him. Afterwards he went to Antwerp; and being brought over to the Catholic religion, he abjured that of the Protestants. The king of France rewarded him with a pension, and ordered him to be admitted supernumerary associate of the academy of inscriptions. But he did not enjoy this new settlement long; for he died in 1716, aged 46. He was a great master of the Latin tongue, and wrote well in it; but his chief excellence was his skill in the Greek language, to which he almost entirely devoted himself. He wrote many works; the principal of which are, 1. *Historia critica Homeri.* 2. *Jamblicus de vita Pythagoræ* 3. An excellent edition of Suidas, in Greek and Latin, three volumes, folio. 4. An edition of Aristophanes in Greek and Latin, folio. 5. A new Greek edition of the New Testament, with Dr. Mills's Variations, in folio.

To KYD. *v. n.* (corrupted probably from cuð Saxon.) To know (*Spenser*).

KYLLINGIA. In botany a genus of the class triandria, order monogynia. Ament ovate or oblong, imbricate; calyx two-valved; corol two-valved. Eight species, natives of the East or West Indies.

KYPHONISM, Kyphonismus, or Cyphonismus, an ancient punishment, which was frequently undergone by the martyrs in the primitive times; wherein the body of the person to suffer was anointed with honey, and so exposed to the sun, that the flies and wasps might be tempted to torment him. This was performed in three manners; sometimes they only tied the patient to a stake; sometimes they hoisted him up into the air, and suspended him in a basket; and sometimes they stretched him out on the ground, with his hands tied behind him. The word is originally Greek, and comes from κυφων, which signifies either the stake to which the patient was tied, the collar fitted to his neck, or an instrument wherewith they tormented him:

KYRIE. The vocative of a Greek word signifying lord, and which the Italians generally write *Chirie.* Masses and services frequently begin with this word. It is sometimes used as the designation of a sacred composition: as when we call a mass or service, opening with it, a fine *Kyrie.*

L

L, EL, a semi-vowel, or liquid consonant, making the eleventh letter of the English alphabet, and always preserving the same sound.

The *l* is pronounced by applying the tongue to the palate.

Passerat observes, that *l* was frequently used among the ancients for *b*, as in *cillibæ* for *cibillæ*; for *d*, as *alipe* for *adipe*; for *c*, as *mutila* for *mutica*; for *n*, as *arvilla* for *arvina*, *belle* for *bene*, *colligo* for *conligo*; for *r*, as *fratellus* of *frater*, *balatrones* for *baratrones*; for *s*, as *ancille* of *am* and *cæsum*, *equilio* for *equisio*; for *t*, as *equiselis*, for *equisetis*, *Thelis* for *Thetis*. See B, T, &c.

The *ll* is a modern contrivance, and was never used among ancient Roman authors: they wrote *alium*, not *allium*; *macelum*, not *macellum*; *polucere*, not *pollucere*.

The *ll* of the Greeks was sometimes changed by the Romans into *li*, as in αλλομαι, *salio*; αλλος, *alius*; φυλλον, *folium*: r has also been turned in *ll*; as *lira*, *illa*; *sarare*, *satullare*, &c. and *l* in *x* or *xill*; as *ala*, *axilla*; *mala*, *maxilla*; *velum*, *vexillum*; *d* was also used for *l*, *n* for *ll*, and *r* for *l*. See R, &c.

L is also frequently used instead of *d*, as in *Ulysses*, from the Greek Οδυσσευς, in the Æolic dialect Υδυσσης. Thus also for *dautia*, we say *lautia*; for *dacrumæ*, *lacrymæ*, &c. See D.

Among the Saxons the *l* was aspirated, and the Spaniards and Welsh usually double it at the beginning of a word, which sounds nearly the same with our *hl* or *fl*. At the end of a monosyllable it is always doubled. except after a dipthong. In a word of more syllables it is written single. It is sometimes inserted before *e*, and sounded feebly after it.

The figure of our *L* we borrowed from the Latins, they from the Greeks, and they again from the Hebrews, whose *lamed* is much like our *L*, excepting that the angle is somewhat more acute.

L was also a numeral letter among the ancients, and is still so in the Roman cyphering, signifying *fifty*; according to the verse,

Quinquies *L* denos numero designat habendos.

When a dash was added to the top, thus, $\overline{\text{L}}$, it stood for *fifty thousand*.

L was used for fifty, being half a C, which signified a hundred, and was formerly written thus, ㄈ, which according to Pasquier, makes two LL, the one upright, and the other inverted.

The French Louis d'ors have a cross on them, consisting of eight *L's* interwoven, and disposed in form of a cross. The letter *L* is marked on the money coined at Bayonne. The epochas on Greek medals are usually written with the ancient *lambda*, *L*; which, according to the tradition of the antiquaries, stands for Λυκαβαντος, a poetical word, unknown in common speech, signifying *anno*, and which it is probable was more used in Egypt than Greece.

L as an abbreviature stands for Lucius; and *LLS.* for a seterce. In English it denotes a pound sterling.

LA, In the Italian music, a syllable by which Guido denominated the last sound in each hexhachord; if it begins in C it answers to our A, if in G to E, if in F to D.

La. *interject.* See; look; behold (*Shaksp.*)

LABADIE (John), a famous enthusiast, was born in 1610, and educated in the Jesuits' college at Bourdeaux. He afterwards entered of the order, but quitted it in 1639, and became a zealous preacher. His affected piety procured him many admirers, and he became canon of the cathedral at Amiens, which place he was obliged to leave on account of some amours. In 1666 he began to publish his peculiar doctrines with great boldness, in which he set aside the Scriptures, and all outward worship, resolving the whole of religion into spiritual feeling and mental prayer. One of his principal followers was Anna Schurman, who attended him in all his peregrinations to his death. He caused great disturbances in the United Provinces by his notions, which spread like wild-fire, and those who held them were called Labadists. After having been expelled from various places he went to settle at Altena in Holstein, where he died in 1674. His works are numerous, but not worth mentioning.

LABADISTS, the followers of Labadie.

LABARUM, the banner or standard borne before the Roman emperors in the wars. The labarum consisted of a long lance, with a staff a-top, crossing it at right angles; from which hung a rich streamer, of a purple colour, adorned with precious stones. Till the time of Constantine it had an eagle painted on it; but that emperor in lieu thereof, added a cross with a cipher expressing the name of Jesus. This standard the Romans took from the Germans, Dacæ, Sarmatæ, Pannonians, &c. whom they had overcome. The name labarum was not known before the time of Constantine.

LABAT (John Baptist), a celebrated traveller, of the order of St Dominic, was born at Paris, taught philosophy at Nancy, and in 1693 went to America in quality of a missionary. At his return to France in 1705,

he was sent to the chapter of his order at Bologna to give an account of his mission, and staid several years in Italy. He died at Paris in 1738. His principal works are, 1. A New Voyage to the American Islands, 6 vols. 12mo. 2. Travels in Spain and Italy, 8 vols. 12mo. 3. A New Account of the Western Parts of Africa, 5 vols. 12mo.: father Labat was not in Africa, and therefore was not a witness of what he relates in that work. He also published the Chevalier des Marchais's Voyage to Guinea, in 4 vols. 12mo.; and an Historical Account of the Western Parts of Æthiopia, translated from the Italian of father Cavazzi, 5 vols. 12mo.

LABA'TIA. In botany a genus of the class tetrandria, order monogynia. Calyx, four-leaved, inferior; corol subcampanulate, four-cleft, with two minute segments in the divisions of the corol; capsule four-celled; seeds solitary. Two species—one a native of Hispaniola; the other of Guiana. The last a tree forty feet high, with axillary flowers triate or timate; the corol greenish.

LABDANUM. See LADANUM.

To LA'BEFY. *v. a.* (*labefacio*, Latin.) To weaken; to impair.

LA'BEL. *s.* (*labellum*, Latin.) 1. A small slip or scrip of writing (*Shaks.*) 2. Any thing appendant to a larger writing (*Ayliffe*). 3. (In law.) A narrow slip of paper or parchment affixed to a deed or writing, in order to hold the appending seal (*Harris*).

LA'BENT. *a.* (*labens*, Lat.) Sliding; gliding; slipping.

LABEO (Quintius Fabius), a Roman consul, B.C. 183. He was a soldier and a man of liberality and talents, and assisted Terence in writing some of his plays.

LABEO (Antistius), a Roman lawyer, who greatly opposed the ambitious views of Augustus. His father was one of the conspirators who slew Cæsar, and this Labeo was killed at the battle of Philippi.

LABERIUS, a Roman knight, who wrote Mimes, or trifling satirical productions for the stage. Julius Cæsar obliged Laberius to perform one of his own Mimes contrary to his will. Laberius on this occasion spoke a prologue, in which he threw out several fine strokes of satire against Cæsar. This piece is preserved in Aulius Gellius; fragments of his other works are also extant.

LA'BIA, in anatomy. See LIPS.

LA'BIAL. *a.* (*labialis*, Lat.) Uttered by the lips (*Holder*).

LA'BIATE FLOWER. In botany, a term of Tournefort's. Linnéus uses the term *Ringens*, including under it both Labiate and Personate flowers. In *Delin. Pl. Ringens* (corolla) is made synonymous with *Labiate*. This term is applied likewise to the calyx. See RINGENT and PERSONATE.

The confusion would be cleared up, if we might be allowed to put *Labiate*, for an irregular monopetalous corol with two lips; and to appropriate the term *Ringent* to such as have the lips gaping or open—*Personate*, to such as have them closed.

Labium, the lip, is usually applied by Linnéus to both lips of a labiate corol, with the distinction of superior and inferior. But it is sometimes used for the lower lip in opposition to the upper lip, which is then called *Galea*, the helmet.

LA'BIATED. *a.* (*labium*, Latin.) Formed with lips.

LA'BIODENTAL. *a.* (*labium* and *dentalis*, Latin.) Formed or pronounced by the cooperation of the lips and teeth (*Holder*).

LABO'RANT. *s.* (*laborans*, Lat.) A chemist: not in use (*Boyle*).

LABO'RATORY (from *labor*, Lat.) In chemistry the room or office in which the experimentor operates. It may be some satisfaction to those of small means to be informed that most of the admirable researches of Scheele, Priestley, Crawford and Berthollet were conducted by means of a very simple and cheap apparatus. Yet a well furnished and convenient laboratory possesses so many important advantages, that no chemist will be without such a building who has it in his power to command one: and hence it may not be unacceptable to those who are entering upon chemical studies to give a short list of such articles of furniture as may be considered as almost indispensable to carry on a general course of experiments, omitting however, several nice and complicated instruments which have been devised for many experiments of research, such for example as the composition of water. If the chemist have opportunity of building a laboratory, or of converting a considerable part of a small house to the purpose, it will be more convenient both to have a ground floor, and an upper story; on the ground floor he may build his brick furnaces, keep charcoal and other fuel, grind and sift different materials, evaporate large quantities, and do all those things which make much dust or fumes, and reserve the upper room for the nicer and cleaner experiments. But if he can only devote a single room to chemical uses, it is on the whole preferable to have it above the level of the ground, on account of its being much drier, for a damp air rusts every thing of iron and steel, spoils the scale beams, loosens the gummed labels to the bottles, renders many salts damp and deliquescent, and produces many other inconveniences. The only advantage of a ground floor, is the greater convenience of bringing water (which is abundantly required), but this is not at all counterbalanced by the trouble of dampness. The first object to be considered is, the mode of applying heat, or the selection of furnaces. If the chemist has only a single room with a common fire-place, the latter should be made as wide as possible, and the grate removed to give room for one or two portable furnaces. There may be a Black's furnace with sand bath, earthen tube, muffle, and other appurtenances, and a small blast, which will suffice for most operations; besides which it is extremely convenient to have one or two large black-lead pots with a grate near the bottom, an ash-hole cut below it, and the top deeply indented in the form of battlements, over which a large evaporating pan or other vessel may be set, and heated by charcoal. It is a great saving of room to have an iron flue hanging a few feet from the ground, and running up in front of the chimney piece, and penetrating into the chimney near the

top of the room, under which a small chamber furnace, or a charcoal pot may be set without encumbering the fire-place. The chimney of the Black's furnace should be lengthened by an iron pipe of at least six or eight feet long and fixed up in the chimney of the room by iron cramps, which increases its draught prodigiously. The room should be amply furnished with shelves for bottles and glass apparatus, and with as many or as large deal tables as can conveniently stand in it, one of which should be substantial and heavy, or else a kitchen dresser may be put up with drawers below. A small set of drawers, such as apothecaries use, will be highly convenient. If possible a stone sink should be placed at one corner of the room, with a supply of clean water, and conveniencies for draining bottles, &c. A solid block of wood is also useful for supporting a mortar when pounding hard substances, and in which an iron anvil may be stuck when required. These being arranged, the chemist must furnish himself with the most useful apparatus, of which the following are the principal articles. The description of each individual article, with the kind to be preferred, will be found under their respective heads.

A gazometer with the connecting tubes, blowpipe, &c.

A bladder or silk bag with stop cock fitting the above.

A Pneumatic water trough.

A copper still with worm tub, the still fitting into the top of the Black's furnace.

A blow-pipe with spoon, &c.

Lamps.—An Argand and others of a common construction for oil and alcohol.

An apparatus for drying precipitates by steam.

Scales and weights.

Large and small iron stands for retorts, &c.

Mortars, one of hard steel, one of bell mettle, and one or two of Wedgewood ware.

A silver crucible and spatula.

A platina crucible and spatula.

A jointed iron tube for conveying gasses.

The following Articles in Glass.

Retorts of different sizes plain and stoppered, and long necked for gasses.

Receivers to fit the above, plain and stoppered, with or without an adopter.

Plain jars for gasses, different sizes.

Lipped jars for mixtures, precipitate, &c.

A graduated eudiometer jar.

Bell receivers two or three sizes.

Proof bottles.

Capsules or small evaporating cups.

Water glasses (such as are used at table) which are very convenient for gentle evaporations.

Florence flasks.

Matrasses two or three very small, and others of common size, round and flat-bottomed.

Funnels ribbed, and one plain with a very long neck for charging retorts.

Wine-glasses common or lipped.

Watch-glasses for evaporating minute quantities at a very gentle heat.

Common decanters.

A bottle for specific gravity of fluids.

Phials of all sizes, plain and with ground stoppers.

Plain glass tubes of various thickness, and one for the purpose of syphons, beat tubes for gasses, capillary tubes for dropping liquids, &c.

A gass-saturating apparatus.

A Woulfe's apparatus.

A tube of safety, separate.

A barometer.

Thermometers common and with the bulb naked.

The following in Earthen-ware.

Crucibles. Hessian, common and black lead, with stands and covers.

Retorts.

Cupels.

Wedgewood evaporating dishes, a set.

White basons with lips, different sizes.

Common white cups and saucers.

Tubes straight and bent.

Porcelain spoons.

Do. rods for stirring corrosive fluids.

Stone jars with tin covers for holding salts, &c.

Also the following Sundries.

A mercurial pneumatic trough.

Wire—different sizes and kinds, viz. iron, copper, brass, silver, and platina, gold, silver and leaf; tinfoil.

Fire-tongs, various shapes.

Steel spatula and pallet-knives,

Iron ladles.

Diamond for scratching glass.

Files, flat, three-cornered and rat-tailed.

Hammers.

A vice and anvil.

Pincers.

Shears and scissars.

A magnet.

Sieves.

Corks.

Bladder, spirit varnish, sponge, tow, linen, flannel.

Windsor and common bricks, tiles, sand.

Lutes of various kinds.

And for more Delicate and Extensive Researches.

A mercurial and pneumatic trough.

A mercurial gazometer.

A burning lens.

An electrical apparatus.

A galvanic apparatus.

A detonating jar.—A glass or silver alembic.

LABO'RIOUS. *a.* (*laborieux*, French; *laboriosus*, Latin.) 1. Diligent in work; assiduous (*South*). 2. Requiring labour; tiresome; not easy (*Addison*).

LABO'RIOUSLY. *ad.* With labour; with toil (*Decay of Piety*).

LABO'RIOUSNESS. *s.* (from *laborious*.) 1. Toilsomeness; difficulty (*Decay of Piety*). 2. Diligence; assiduity.

LA'BOUR. *s.* (*labeur*, French; *labor*, Lat.) 1. The act of doing what requires a painful exertion of strength; pains; toil (*Shaks.*) 2. Work to be done (*Hooker*). 3. Work done; performance. 4. Exercise; motion with some degree of violence (*Harvey*). 5. Childbirth; travail (*South*).

To LA'BOUR. *v. n.* (*laboro*, Latin.) 1. To toil; to act with painful effort (*Shaks.*) 2. To do work; to take pains (*Ecclus*). 3. To move with difficulty (*Granville*). 4. To be diseased with: not used (*B. Jonson*). 5. To be in distress; to be pressed (*Wake*). 6. To be in childbirth; to be in travail (*Dry.*)

To LA'BOUR. *v. a.* 1. To work at; to

move with difficulty (*Pope*). 2. To beat; to belabour (*Dryden*).

LA'BOURER. *s.* (*laboureur*, French.) 1. One who is employed in coarse and toilsome work (*Swift*). 2. One who takes pains in any employment (*Granville*).

LABOUREUR (John le); a French writer and ecclesiastic, was born at Montmorency in 1623. He was for some time in an office about the court, but afterwards entered into orders, and became prior of Juvigné. In 1664 the king appointed him commander of the order of St. Michael, in testimony of his esteem for his talents and virtues. He died in 1675. He wrote the History of the Marshal of Guebriant, with the Genealogy of Budos, and some other houses in Brittany; and published an edition of the Memoirs of Michael de Castelnau, and other curious works. His uncle, Claude le Laboureur, published also several books of considerable merit.

LA'BOURSOME. *a.* Made with great labour and diligence: not in use (*Shakspeare*).

LA'BRA. *s.* (Spanish.) A lip: not used (*Shakspeare*).

LABRADOR, a country on the east side of Hudson's Bay, in North America. The climate, in only lat. 57°. N. is excessively cold during winter. Wine freezes in a solid mass; brandy coagulates; and the very breath falls on the blankets of a bed, in the form of a hoar-frost. The ice begins to disappear in May; and about the middle of June commences hot weather, which, at times, is so violent as to scorch the faces of the hunters. Mock suns and halos are not unfrequent: they are very bright, and richly tinged with all the colours of the rainbow. The sun rises and sets with a large cone of yellowish light; and the night is enlivened by the aurora borealis, which spreads many different lights and colours over the whole sky. The animals are moosedeers, stags, reindeers, bears, tigers, buffaloes, wolves, foxes, beavers, otters, lynxes, martens, squirrels, ermines, wild cats, and hares. The feathered kinds are geese, bustards, ducks, partridges, and all kinds of wild fowls. The fish are whales, morses, seals, codfish, and a white fish preferable to herrings; and in their rivers and fresh waters are pike, perch, carp, and trout. In summer there is here, as in other places, a variety in the colour of the several animals: when that season is over, which holds only for three months, they all assume the livery of winter, and every sort of beasts, and most of their fowls, are of the colour of the snow: every thing animate and inanimate is white. But one of the most striking things, that draws the most inattentive to an admiration of the wisdom and goodness of Providence, is, that the dogs and cats from Great Britain, which have been carried to Hudson's Bay, have changed their appearance on the approach of winter, and acquired a much longer, softer, and thicker coat of hair than they originally had. See New Britain, Esquimaux, and Hudson's Bay.

Labrador *Stone.* In mineralogy. See Feldspatum.

Labrador *Tea.* In botany. See Ledum.

LA'BRUM, in antiquity, a bathing tub.

LA'BRUS. Wrasse. In zoology, a genus of the class pisces; order thoracica. Teeth sharp; lips simple; gill-membrane, with about six rays; the covers scaly; dorsal fin, with a slender skin beyond the end of each ray: lateral line straight. Seventy-two species; inhabiting the different parts of the globe: of which nine are common to the coasts of our own country. They may be thus subdivided:

A. Tail forked.

B. Tail entire, comprehending by far the greater number. The chief species are the following:

1. L. Tinca. Old wife. Upper jaw turned up; tail rounded; mouth able to be drawn in or protruded. Inhabits deep waters on the British coasts; grows to five pounds weight; feeds on shell-fishes and testaceous animals; varies much in its colours, sometimes dirty red, and sometimes beautifully striped.

2. L. Ballan. Ballan wrasse. Body yellow, spotted with orange; above the nose a deep furrow; farthest gill-cover with a depression radiated from the centre. Found during summer in great shoals at Scarborough: size of the last, and perhaps only a variety of it.

3. L. Cornubiensis. Goldfinny. Near the tail a large black spot; first rays of the dorsal fins tinged with black. Inhabits the Cornish coast: about a palm long.

4. L. Comber. Comber. Back, fins, and tail red; belly yellow; tail rounded. Inhabits the coasts of Cornwall: body slender, small.

5. L. Coquus. Cook. Body purple and dark blue, beak yellow; tail rounded. Inhabits the Cornish coasts: small in size.

LA'BURNUM, in botany. See Cytisus.

LA'BYRINTH, Λαβυρινθος, among the ancients, was a large and intricate edifice cut out into various isles and meanders, running into each other, so as to render it difficult to get out of it.

There is mention made of four celebrated labyrinths among the ancients, ranked by Pliny in the number of the wonders of the world, viz. the Cretan, Egyptian, Lemnian, and Italian.

That of Crete is the most famed; it was built by Dædalus, for king Minos, on the model of that of Egypt; and it was hence that Theseus made his escape by means of Ariadne's clue.

That of Egypt, according to Pliny, was the oldest of all; and was subsisting in his time, after having stood 3600 years. He says it was built by king Petesucus, or Tithoës; but Herodotus makes it the work of several kings: it stood on the banks of

the lake Mœris, and consisted of twelve palaces, in which the twelve kings of Egypt assembled to transact affairs of state and religion, containing three thousand apartments. See a plan and description of this labyrinth, in the present state of it, in *Pocock's Hist. of the East*, vol. i. p. 61, &c. See also *Perry's View of the Levant*, p. 381, &c.

That of Lemnos was supported by columns of wonderful beauty; there were some remains of it at the time when Pliny wrote. That of Italy was built by Porsenna, king of Hetruria, for his tomb.

LA'BYRINTH. In anatomy that part of the internal ear behind the cavity of the tympanum, which is constituted by the cochlea, vestibulum, and semicircular canals.

LAC. See Milk.

Lac. (Gum). *Lacque*, French. From the Hebrew ילק which last is generally understood to imply the may-bug, or chafer (θρουχος). Neither the insect that affords this substance, denominated lac from the name of the insect itself, nor the substance secreted, have been hitherto distinctly explained. We shall offer the latest, and apparently the most accurate account of this subject, from Dr. Buchanan's "Journey from Madras through Mysore, Canara, and Malabar."

"I took an opportunity, in company with this *amildan*, of examining into the management of the lac insect; and for this purpose we collected all the people who follow that employment. The people who manage the lac insect in the hills near Mandidurga are of the cast called Woddaru; and for the exclusive use of the tree, they pay a rent to government. The tree on which the insect feeds is the *jata*, which is nearly related to *saul*, of Bengal, or the storea of Gærtner, and perhaps the *batia* Chinensis of Linnéus. All the trees that I saw here were small, not exceeding eight or ten feet in height; and their growth was kept down by the insect and its managers, for this size answers best. The tree, left to itself, grows to a large size, and is good timber. For feeding the insect, it thrives very well in a dry barren soil; and is not planted, but allowed to spring up spontaneously as nature directs. It is often choked by other trees, and destroyed by bamboos, which by rubbing one against another, in this arid region, frequently takes fire, and lays waste the neighbouring woods. By removing all other trees from the places where the jala naturally grows, and perhaps by planting a few trees on some other hills, and protecting them from being choked as they gradually propagate themselves, the lac insect might be raised to any extent on lands now totally useless, and never capable of being rendered arable. In Kartika, or from about the middle of October to the middle of November, the lac is ripe. At that time it surrounds every small branch of the tree, and destroys almost every leaf. The branches intended for sale are then cut off, spread out on mats, and dried in the shade. A tree or two, that are fullest of the insect, are preserved to propagate the breed; and of those a small branch is tied to every tree in the month Chaitra, or from about the middle of March to the middle of April; at which time the trees again shoot out young branches and leaves. The lac dried on the sticks is sold to the merchants of Balakari, Gutti, Bangalore, &c.; and, according to the quantity raised, and the demand, varies in price from 5 to 20 fanams a *maund*. This is what is called *stick-lac*." Vol. I. p. 343 344.

The lac thus collected is purified or accumulated by additional processes: and have, independently of

1. Stic-lac, we have
2. Seed-lac, which consists of stick-lac broken into small lumps, granulated and picked.
3. Lump-lac; which is seed-lac liquified by fire.
4. Shell-lac; which is the shells of the stick-lac, liquified by gentle heat, strained, and formed into thin transparent laminæ in the following manner: it is broken into small pieces, and picked from the branches and sticks, and put into a canvas bag. This is placed over the fire, and frequently turned till the lac is liquid enough to pass through its pores, when it is taken off and squeezed by two men in different directions, dragging it along the convex part of a plantain tree, prepared for the purpose. The degree of pressure on the plantain tree regulates the thickness of the shell.

"To give the red dye with lac, take $1\frac{1}{2}$ maund 38 $\frac{67}{100}$ lb. of lack cleared from the sticks, $1\frac{1}{2}$ seer (0 $\frac{967}{1000}$ lb.) of Soda bark, $1\frac{1}{2}$ seer of Caja Cara, or Soda, and two Dudus weight (12 $\frac{942}{1000}$) of hermeric: put them into a narrow-mouthed pot, capable of holding 80 seers (5492 cubical inches), with 40 seers of water, and boil them four hours; then decant the liquor which is impregnated with the die; and having to the same material added 20 seers more of water, boil them again for three hours; decant this liquor into the former, and then for three hours boil the materials a third time with 10 seers of water. Decant this also into the two former, and preserve, in a covered pot, the whole liquor for eight days. At the end of this period the workman judges how much silk his materials will dye. If the lac have been good, it will dye 5 seers (3 $\frac{223}{1000}$ lb.); but if poor, it will not dye more than $3\frac{1}{2}$ seers. For 5 seers of silk, taks 20 seers of tamarinds, and for two days infuse them in 18 seers of water; then strain the infusion through a thick cloth till about 5 seers of clear infusion are procured. Put this into a large open pot with the silk, and warm them

until they be rather too hot for the hand. Take out the silk and pour into the warm infusion of tamarinds three-quarters of the decoction of lac strained through a cloth: then return the silk, and boil it for three hours. After this examine the silk. If it have received a proper colour, nothing more is added; but if the colour be not deep enough, the remaining decoction is strained and added by degrees, till the colour is completed. When cool, the silk must be washed in cold tank-water, and dried in the shade. This is the finest red dye in use here (Bangalore): in some places cochineal is used: but it is much more expensive. The lac dye is not discharged by washing." *Ibid.*

The substance constituting lac is a secretion from the parent female insect, for the purpose of glueing its eggs now just deposited, to the branches upon which they are placed; and also for the purpose of providing the young larves with food as soon as the rays of the sun have given them animation. It consists, upon a minute examination, of a multitude of minute bags, each bag having a variety of distinct cells like a honey-comb, but of a different shape.

The three common species of lac have been analysed by Mr. Hatchett, and the leading results are as follow:

When water is poured on the stick-lac coarsely powdered, it soon begins to turn red, and by heating a crimson-coloured solution is obtained. Shell-lac loses by this about 10 per cent. of its weight, and the undissolved residue becomes yellowish brown. The watery solution contains the colouring extract, one of the ingredients of lac, but does not extract the whole at once, on account of its intimate union with the other constituent parts. Alkohol dissolves a large portion of all the kinds of lac. The portion soluble in cold alkohol, and which is entirely resin, except a little extract, amounts to about 68 per cent. from stick-lac, 88 from fine seed-lac, and 81 from shell-lac; but in the latter case, about ten more of the resin remain mixed with the other ingredients. Hot alkohol dissolves also other parts of the lac, which are not easily separable again. Sulphuric ether dissolves less of the lac than alkohol. Of the acids, nitre acts most powerfully, and converts it into a brittle opake, yellow substance. Potash and soda dissolve all kinds of lac.

Lac is used among ourselves as the basis of sealing-wax; and in Portugal and Barbara, in shining goat-skins, so as to form what is called *red Morocco leather*.

Lac *ammoniaci*. A very nauseous attenuant, expectorant, and antispasmodic preparation of ammoniacum.

Lac *amygdalæ*. A very pleasant, cooling, demulcent drink, calculated to alleviate ardor urinæ, and relieve strangury. It forms a pleasant ptisan in coughs, hoarsenesses, and catarrhs, and is denominated in the last edition of the London Pharmacopoeia *Mistura amygdalæ*.

Lac *sulphuris*. See Sulphur *precipitatum*.

Lac *tree*. See Croton.

LACARRY (Giles), a French jesuit, born in 1605, and died in 1684. He wrote, 1. Historia Galliarum sub prefectis Prætorii Galliorum 4to.; 2. Historia Coloniarum a Gallis in exteras nationes missarum, 4to.; 3. De Regibus Franciæ et Lege Salicæ; 4. Historia Romana, 4to.; 5. Notitia Provinciarum Imperii utriusque cum Notis, 4to.

LACCIC Acid, is yielded by the *Lac* (white), which is also an animal secretion, though we are less acquainted with the insect that produces it, than with that which gives the gum-lac. White lac is a waxy substance, and by various experiments, appears to have a very close chemical analogy with bees' wax, though in a few particulars it differs from it. It has also a very near resemblance to the *Pe-la* of the Chinese, or the white wax used in varnishes for candles. It is exported from India in grey, opake, rough, roundish pieces, of about the size of a pea. It has a saltish and bitterish taste: but when fresh gather ed, it appears from Dr. Anderson's account to have a sweetish and delicious flavour. It has no smell unless when used; after melting and straining, it sinks in water.

When heated in water it melts at 145, and then a reddish liquid separates from the lac and mixes with the water. This liquid has various properties of an acid and is hence denominated *Laccic Acid*.

After the separation of this acid the remaining substance is of the colour of bees' wax, and hard and brittle as resin. On digesting it with a solution of pot-ash, Dr. Pearson found that it became brown, gave a smell like palm-oil, and united with the alkali to a coagulated mass, but could not be brought to the state of a true soluble soap. The solution was decomposed by acids. Ammonia had nearly the same effect as pot-ash. Candles were made of this substance with cotton wicks, which burned rapidly and gave much smoke and a resinous smell. In this respect it differs from the Chinese pe-la, which burns as well as the finest wax and with as little smoke.

Heated with nitrous acid it gives out much nitrous gass. It is totally dissolved in five parts of oil of turpentine, but the solution grows turbid as it cools. Ether dissolves a tenth part of its weight but imperfectly. Alkohol by repeated affusion dissolves all but 15 per cent. of this lac.

LACTIC Acid. A peculiar acid upon which depends the facility with which milk or whey undergo the acetous fermentation, and which was first ascertained by the experiments of Scheele. See the article Milk.

LACE. *s.* (*lacet*, French.) 1. A string; a cord (*Spenser*). 2. A snare; a gin (*Fairf.*) 3. A platted string, with which women

fasten their clothes (*Swift*). 4. Ornaments of fine thread curiously woven (*Bacon*). 5. Texture of thread, with gold or silver. (*Herbert*). 6. Sugar. A cant word; now out of use (*Prior*).

To LACE. *v. a.* (from the noun.) 1. To fasten with a string run through eilet holes (*Congreve*). 2. To adorn with gold or silver textures sewed on (*Shakspeare*). 3. To embellish with variegations (*Shakspeare*). 4. To beat; to lash (*L'Estrange*).

LACE, in commerce, a work composed of many threads of gold, silver, or silk, interwoven one with the other, and worked upon a pillow with spindles, according to the pattern designed; the open work being formed with pins, which are placed and displaced as the spindles are moved.

LACE, bone, a lace made of fine linen thread or silk, much in the same manner as that of gold and silver. The pattern of the lace is fixed upon a large round pillow, and pins being stuck into the holes or openings in the pattern, the threads are interwoven by means of a number of bobins, made of bone or ivory, each of which contains a small quantity of fine thread, in such a manner as to make the lace exactly resemble the pattern. There are several towns in England, and particularly in Buckinghamshire, that carry on this manufacture; but vast quantities of the finest laces have been imported from Flanders.

LACE BARK. In botany, see DAPHNE.

LACEDÆMON (fab. hist.), a son of Jupiter and Taygeta the daughter of Atlas, who married Sparta the daughter of Europa, by whom he had Amyclas and Eurydice the wife of Acrisius. He was the first who introduced the worship of the graces in Laconia, and who first built them a temple. From Lacedæmon and his wife, the capital of Laconia was called Lacedæmon and Sparta.

LACEDÆMON, a noble city of Peloponnesus, called also Sparta; these names differing in this, that the latter is the proper and ancient name of the city, the former of the country, which afterwards came to be applied to the city (Strabo, Stephanus). See SPARTA. The present city is called Misitra, situated in E. lon. 23. 0. N. Lat. 36. 55.

LA'CEMAN. *s.* (*lace* and *man.*) One who deals in lace (*Addison*).

LA'CERABLE. *a.* (from *lacerate.*) Such as may be torn (*Harvey*).

To LA'CERATE. *v. a.* (*lacero*, Latin.) To tear; to rend (*Derham*).

LACERA'TION. *s.* (from *lacerate.*) The act of tearing or rending; the breach made by tearing (*Arbuthnot*).

LA'CERATIVE. *a.* (from *lacerate.*) Tearing; having the power to tear (*Harvey*).

LACERNA, a thick coarse sort of military garment worn by the ancients. The lacerna was a kind of cloak of woollen, only used by the men; who wore it over the toga, and, when that was not on, over the tunica. It was at first very short, but growing popular in the Roman army, it was soon lengthened.

LACERTA, Lizard, in astronomy, one of the new constellations of the northern hemisphere, added by Hevelius to the 48 old ones, near Cepheus and Cassiopeia.

This constellation contains, in Hevelius's catalogue 10 stars, and in Flamsteed's 16, viz. 0. 0. 0. 3. 6. 7, classed according to their magnitudes.

LA'CERTA. Lizard. In zoology, a genus of the class amphibia, order reptilia. A very numerous, active nimble tribe; all of which, except the aquatic ones, feed on insects. The *crocodiles* have both jaws moveable, and the largest mouth of all animals; their body is covered with callosities. The *chameleons* have a prehensile tail; sit on trees; walk slowly and irregularly, have no teeth; eyes large, fixt in a wrinkled socket; tongue very long, worm shaped, with which they draw in flies: head angular, covered with very thin lucid tubercles or scales.

It is a difficult matter to arrange this tribe into distinct sets or sections; being so numerous and running so imperceptibly into the specific characters of each other. The following is the division of Dr. Shaw.

A *Crocodiles*, furnished with very strong scales.

B *Guanas* and such other lizards as have either serrated or carinated backs and tails.

C *Cordyles*, with denticulated, and sometimes spiny scales or plates on the abdomen.

D *Lizards proper*, smooth, and the greater number furnished with broad square, scales, or plates on the abdomen.

E *Chameleons*, with granuated skin, large head, long missile tongue, and cylindric tail.

F *Geckos*, with granulated or tuberculated skin, and lobatic feet, with the toes lamellated beneath.

G *Skinks*, with smooth fish-like-scales.

H *Salamanders*, and *newts* or *efts*, with soft skins; of which some are water-lizards.

I *Snake-lizards*, with extremely long bodies, very short legs and minute feet.

We shall select a few examples, and with as much variety as we can allow.

1. L. Crocodilus. Common or nilotic Crocodile. Head armed; nape carinate; tail above with two lateral crests.

There is another variety with its snout much shorter than the head; nape naked. Inhabits the Nile; from eighteen to twenty-five feet long; possesses amazing swiftness, voracity and strength; smells of musk; roars hideously; devours men and other large animals, both aquatic and terrestrial; swallows stones to prevent the painful sense of hunger; overturns boats when taken in nets, and is not to be killed

by a musket-ball, unless struck on the belly; is destroyed by tobacco; seldom moves but in a straight line, whence it is easily avoided. Eggs hardly larger than those of a goose, and deposited by the female in the sand.

Eyes wrinkled; ears linear, closed with a flap above; teeth in the upper jaw forty, lower thirty-eight and sharp; fore-feet five toed; hind-feet four-toed, palmate.

Tremendous as this animal is when full grown, in a young state it is by no means to be dreaded; it is not only diminutive from the smallness of its egg, but appears also to be extremely feeble and torpid; at least when brought young into Europe, and may be handled with impunity. But in the glowing climates of Africa, and especially when arrived at its maturity, it is justly regarded as the most formidable monster of the rivers. It is by many biblical critics supposed to be the לויתן (Leviathan) of the Old Testament; chiefly, perhaps, because the fearful and sublime description of this monster (be he what he may) in the book of Job, ch. xi. and xli. does not sufficiently correspond with the general structure and habits of the whale or great mysticete. Yet the לויתן of Job, when minutely examined, will as little correspond with the common crocodile as with the whale: and it is probable that like the mammoth the Leviathan of the scriptures has now ceased to exist: an idea which, we believe, has never been hazarded before, but which the great variety of extinct monsters of enormous magnitude, the skeletons of some of which have been obtained by M. Cuvier and other celebrated zootomists, will justify us in propounding.

The crocodile lies in wait near the banks of the Nile, and snatches dogs and other animals, swallowing them instantly, and then plunging into the flood and seeking some retired part where it may lie concealed till hunger again invites it to its prey. The water-newt imitates its manner of attack, which though not more than about four or five inches long will, with the greatest ease, swallow an insect of more than an inch in length; and that at a single effort and with a motion so quick that the eye can scarcely follow it. It poises itself in the water, and having gained a convenient distance, springs with the utmost celerity on the insect and swallows it. If, therefore, a small lizard of only four or five inches in length can thus instantaneously swallow an animal of a fourth part of its own length, we need not wonder that a crocodile of eighteen, twenty or twenty-five feet long should suddenly ingorge a dog or other quadruped. The shell of the crocodile, which we have already observed, is not much larger than that of a goose, has a near resemblance to it in other respects also; consisting of a calcareous incrustation, with an interior membrane that lines it. The eggs as well as the flesh of the crocodile are esteemed delicacies by some of the African nations, and constitute a part of their richest meals.

In the large rivers of Africa crocodiles are said to be sometimes seen swimming together in large shoals, resembling the trunks of so many huge trees floating on the water. The negroes will sometimes attack and kill a single crocodile by stabbing it under its belly. It is also the custom in some countries to hunt the crocodile by means of strong dogs properly trained to the sport, and armed with spiked collars. Yet we have much reason for doubting the truths of this assertion, as the spiked collar would be but a poor defence against the ingorgement of the dog, and certainly none against his digestion in the stomach. It is likewise pretended that in some parts of Africa crocodiles are occasionally tamed, and form an article of royal magnificence with the monarchs of those regions, being kept in large ponds or lakes for this purpose. Among the Romans, Scaurus, during his ædileship, treated the people with a sight of five crocodiles, exhibited in a temporary lake; and Augustus introduced one into his triumph over Cleopatra, as well as several others afterwards for the entertainment of the people.

It is denied by Grew and some other naturalists that the crocodile moves its upper jaw: but later zootomists appear to have established the fact in a manner the most convincing.

2. L. Gangetic. Gangetic, or Indian crocodile. Jaws long, round, subrylindric; tail a bow with two crests running into one. Snout nearly three times as long as the head; nape with six mamillary scales: teeth, upper jaw sixty; lower fifty-eight, sharp. It is chiefly distinguished from the crocodile of the Nile, by the peculiarity of its mouth, and the great number of its teeth, which are nearly double those of the preceding species.

3. L. Alligator. Alligator. Head flat, imbricate; nape naked; tail above with two rough lateral lines. The general manners and habits of the alligator so nearly resemble those of the crocodile that M. de la Cepede and several other Zoologists have regarded it as a mere variety, ascribing the slight differences that occur to an American instead of an Asiatic or African climate. Yet Blumenbach has pointed out difference enough to render them really distinct species. It differs most essentially from the crocodile in having the upper part of its head much smoother; and in possessing a snout much flatter and wider. The general size is not much inferior to that of the crocodile, and the number of teeth are alike in both.

The largest and greatest number of alligators are found in the hottest regions of America, yet Catesby affirms that they

are found as low as in latitude 38, which nearly corresponds to the northernmost parts of Africa, where, indeed they also exist. They live equally in fresh or salt waters: are very numerous in South Carolina; and from October to March lie torpid in caverns and hollows in the banks of rivers; and at their coming forth in the spring make a hideous bellowing. They are also found occasionally on the Jamaica coast, measuring in that situation about twenty feet in length.

4. L. Monitor. Monitor-lizard, of which there are seven varieties.

α. Tail carinate; body unarmed; with ocellate spots.

β Green with red spots.

γ Tesselate grey and white.

δ Cinereous spotted with black; tail very thick.

ε Blue spotted with white.

ζ With six longitudinal rows of spots on the back.

η Sea-green with blackish ocellate spots.

Inhabits America and Southern Asia; about three feet long; frequently accompanies the crocodile and alligator; of whose approach it is said to give notice to other animals by its hissing: whence its specific name.

5. L. bimaculata. Pennsylvanian lizard. Tail carinate, toothed, twice as long as the body; all the toes lobate: body greenish blue, mostly spotted with black; the shoulders with two larger spots; feet all five-toed. Inhabits the woods of St. Eustace and Pennsylvania, and lives in holes, gutters, and hollow trees; makes a hissing noise, and deposits its eggs in the earth.

6. L. Basiliscus. Basilisk. Tail rounded, long; dorsal fin radiate: hind-head crested, covered by a hollow, scaly, conic, compressed membrane; dorsal fin scaly, and which it can fold up or expand at pleasure when sitting on a tree. Inhabits South-America, and appears to occupy a place between the lizard and the dragon.

Notwithstanding the tremendous accounts given by Lucan and other ancient poets of the poisonous and rapacious nature of this animal (if indeed their basilisk were the same as ours) it is a perfectly harmless animal, residing principally among trees, and feeding on insects. Colour pale cinereous brown, darker towards the upper part of the body: length one and a half-foot; possessing great agility both in swimming and leaping from tree to tree.

7. L. Iguana. American Guana. Tail round, long; dorsal latuce toothed; gular crest denticulate. Inhabits India, the warmer parts of America, and its adjacent islands; from three to five feet long; lives in rocky and woody places; feeds on insects and vegetables; is easily tamed, and follows mankind like a dog; is caught by a noose thrown over its head; the flesh is reckoned delicious, but does not agree with persons of salacious habits: general colour green, but variously tinged in various animals: has a power of inflating the gular pouch to a large size.

8. L. Palustris. Warted newt. Body blackish; sides speckled with white; belly orange, with irregular black spots; tail on each side, with a broad silvery streak of a blueish cast; back of the male with a flattened crest irregularly serrate. Inhabits the stagnant waters of our own country, and other parts of Europe: less than the water newt.

9. L. Aquatica. Water newt.

α. Tail roundish, middle sized.

β. Brown or yellowish.

γ. Dorsal line dotted with white and black. Inhabits England and other parts of Europe: β. inhabits France; γ. Germany; lives in pools, ditches, and stagnant waters; and dies in three minutes if salt be sprinkled upon it.

10. L. Lacustris. Fenny newt. Black; tail lanceolate, middle-sized. Seven other varieties from difference of size, colour, or occasional marks and dots. Inhabits the lakes of Europe; some of them of Martinico, some of Ceylon: very destructive to fishes.

11. L. Salamandra. Salamander. Tail short, round; body porous, variegated with black and yellow. Four other varieties, black, brown, white, and small in size, brown, with compressed tail. Inhabits Germany and many other parts of Europe; exudes from its pores a milky liquor, by which it is for a small time defended from the action of fire, which has caused the belief of former times that it is inconsumable by fire. This property, however, it possesses in no greater degree than frogs, snails, or many others of its own tribe. It is perfectly innocuous, though in ancient times also supposed to be highly poisonous. Yet it is said that the slimy fluid issuing from its pores to a variety of the common small grey lizard, if the latter swallow any in attempting to bite it. The salamander breeds viviparously, or rather hatches its own eggs internally, as the viper and some other amphibials. It delights in moist and shady places; and is often torpid in the winter, and lies concealed in the hollows about the roots of old trees, in subterraneous recesses, or the cavities of old walls.

12. L. Gecho. Gecho. Tail round, middle-sized; toes a little clawed; ears concave. It is surrounded with warts, those of a larger size being encircled with smaller warts. Inhabits India, Arabia, Egypt, and the warmer parts of Europe; frequents houses in summer, but is seldom seen in winter; makes a noise like a weasel, or like the sound of its own name, which it hence derives; tame; and when frightened will run into houses; emits a poisonous moisture from the lamellæ between its feet, which is sometimes smeared over articles of food it runs across, and produces a deadly colic: stands often

erect on its hind feet, and is capable of adhering to the most polished surfaces.

13. L. Geitje. Tail lanceolate, middle-sized, fore-feet fore-toed, body variegated, beneath whitish, tail like that of the salamander. Inhabits the Cape of Good Hope; hardly three inches long; the moisture exuding from its pores apt to produce dangerous gangrenes.

14. L. Chamæleon. Chameleon. Body cinereous; head flat. Two other varieties; one with body white; the other with very large head. Inhabits India and New Spain: lives chiefly in trees; the lungs enormous, which the animal can inflate to a vast size: eyes so moveable that it can look at the same time in different directions, pupil shining golden; frequently changes its colour, varying it from its natural greenish or blueish grey into a pale yellow, produced apparently by a change in the temperature of the surrounding atmosphere, or some internal morbid affection: but by no means able to exhibit the great variety and contrast of colours at will, which has been commonly asserted of this animal. It is said, however, that much of the variety it does actually discover, proceeds from a power of reflecting the hues of other objects that are opposed or contiguous to it. Body about ten inches; tail nearly as long. It is perfectly harmless to man; feeds chiefly on insects; and is capable of bearing very long abstinences.

15. L. Agilis. Scaly-Lizard: Green-Lizard. Tail verticillate, longish, with sharp scales; collar scaly beneath. Nine other varieties; greenish, brownish, blueish, or speckled in various ways. Scales of the belly usually disposed in six rows; hind thighs marked beneath with a line of callous dots. Inhabits England, and Europe at large, as far as the Lake Baikal; one species found in America: is innocent, active, elegant; lives in dry meadows, walls and rocks: easily tamed, and rendered familiar.

16. L. Velox. Swift Lizard. Tail verticillate, longish; collar beneath scaly; body above cinereous, varied with five longitudinal paler streaks, and brown dots; sides spotted with black and dotted with blueish. Inhabits sultry places about the lake *Inderskien*; wanders among rocks, and is exceedingly swift; resembles the scaly lizard, but is less and much slenderer.

17. L. Seps. Eft. Tail verticillate, long; lateral suture reflected; scales square.

β. Another variety variegated with chestnut; head intermixed with black and white.

γ. A third variety; black-blue, marbled with confluent white bands mixed with round spots. Body covered above and beneath with truncate scales in eight rows, forming lateral and longitudinal streaks; belly flat; legs short, distant, formed for running.

18. L. Sputator. Spitting Lizard. Tail round, middle-sized, with a longitudinal row of scales beneath; feet unarmed, five-toed; body cinereous with white bands above, before and behind edged with liver colour: the whole animal, except the tip of the jaws and the lower surface of the tail, covered with minute truncate scales; tongue round, a little notched at the tip. Inhabits South America, in houses and among old walls; when irritated, discharges a black acrid matter, producing inflammation on the skin, which is cured by camphor or spirits of wine. Length two inches.

19. L. Scincus. Skink. Tail round, middle-sized, compressed at the tip: toes unarmed, marginate.

β. Another variety, with tail very long; toes round. The whole body with the head and tail covered with imbricate scales. Inhabits Lybia, Egypt, and the rocky parts of Arabia: was formerly kept in dispensaries as an aphrodisiac.

20. L. Apus. Cylindrical Lizard. Head, body, and tail, a continued imbricate pale cylinder; no fore-feet; hardly any hind feet; subdidactylous. Inhabits the grassy meadows of the deserts of Southern Siberia, and near the rivers Sarpa, Cuma, and Terek: in general appearance resembles a snake, but in internal structure the lizard.

LACHENALIA. In botany, a genus of the class hexandria, order monogynia. Corol six-parted, inferior, the three inner petals longer; calyx less; stamens erect; capsule subovate, three-winged; seeds globular, affixed to the receptacle. Twenty-four species, all Cape plants, but L. Serotina, which is a native of Spain. The corals are mostly campanulate, but a few cylindrical; the leaves of some species with purple streaks, of a few yellowish or violet tips.

LACHES, from the French *lascher*, i.e. *laxare*, or *lasche*, *ignavus*, in the English law signifies slackness or negligence, as it appears in Littleton, where *laches of entry* is a neglect of the heir to enter. And probably it may be an old English word: for where we say there is *laches* of entry, it is all one as if it were said there is a *lack* of entry; and in this signification it is used.

LACHESIS, in mythology, one of the Parcæ. Her name is derived from λαχειν, to measure out by lot. She presided over futurity, and was represented as spinning the thread of life, or, according to others, holding the spindle. She generally appeared covered with a garment variegated with stars, and holding spindles in her hand.

LACHNŒA. In botany, a genus of the class octandria, order monogynia. Calyxless; corol four-cleft, with an unequal border; nut somewhat drupe-like. Two species: Cape plants.

LACHNOSPERNUM. In botany, a genus of the class syngenosia, order of polygamia equalis. Receptacle villous; seeds wrapped in the down; calyx cylindrical, imbricate. One species: a Cape plant.

LA'CHRYMA Abiegnas. See Terebinthina Argentarotensis.

LA'CHRYMÆ, (*Lachryma*, *æ*. f.) The tears. A limpid fluid secreted by the lachrymal gland, and flowing on the surface of the eye.

LA'CHRYMAL. *a*. Generating tears.

La'chrymal Ducts. The excretory ducts of the lachrymal gland, which open upon the internal surface of the upper eyelid.

La'chrymal Gland. *Glandula lachrymalis*. A glomerate gland, situated above the external angle of the orbit, in a peculiar depression of the frontal bone. It secretes the tears, and conveys them to the eye by its excretory ducts, which are six or eight in number. See Lachrymal Ducts.

LA'CHRYMARY. *a*. (*lachryma*, Latin.) Containing tears (*Addison*).

LACHRYMA'TION. *s*. (from *lachryma*, Lat.) The act of weeping, or shedding tears.

LA'CHRYMATORY. *s*. (*lachrymatoire*, Fr.) A vessel in which tears are gathered to the honour of the dead.

LACINIATE Corol. In botany, *quævis pars in quam limbus corollæ monopetalæ dissectus est.*—Any part into which the border of a monopetalous corol is cut. It is applied also to monophyllous calyxes: and a calyx which has two *laciniæ* is said to be *bifid*, &c. Philos. Bot. p. 63.

Laciniate Jagged. Folium laciniatum. *Varie sectum in partes, partibus itidem indeterminate subdivisis.* This implies an irregularity in the division and subdivision, whereas *lacinia* is the same, with a part, segment or cleft; as Linnéus has explained it.

Laciniate Flower is a term of Tournefort's, for which Linnéus puts *multifida corolla*.

LACI'NIATED. *a*. (from *lacinia*, Latin.) Adorned with fringes and borders.

LACINIUM (anc. geog.), a noble promontory of the Brutii in Italy, the south boundary of the Sinus Tarentinus and the Adriatic, all to the south of it being deemed the Ionian sea: it was famous for a rich temple of Juno, surnamed *Lacinia*, with a pillar of solid gold standing in it; which Hannibal intending to carry off, was, according to Cicero, dissuaded by a dream. Now *Capo delle Colonne*, from the columns of Juno's temple, still standing on the north-east coast of the Calabria ultra.

LACI'NUELATE. In botany. Dimin. from Lacinia. A little jag, or subdivision of the larger one.

LACIS. In botany, a genus of the class polyandria, order digynia. Calyx less; corolless; styles two; capsule one; celled, two-valved, many seeded. One species a Guiana plant, with rough herbaceous stem, simple, terminal racemes.

LACESTEMA. In botany a genus of the class monandria, digynia. Calyx scale of the ament corol four-parted; filaments bifid; bery pedicelled, one-seeded. A Jamaica and Surinam shrub.

To LACK. *v*. *a*. (*laecken*, to lessen, Dutch.) To want; to need; to be without (*Daniel*).

To Lack. *v*. *n*. 1 To be in want (*Common Prayer*). 2. To be wanting (*Genesis*).

LACK. *s*. (from the verb.) Want; need; failure (*Hooker*).

LACK of Rupees, is 100,000 rupees; which, supposing them standard, or siccas, at 2s. 6d. amounts to 12,500l. sterling.

Lack, or Bischofs-lack, a town of Germany, in Carniola. Here is a great deal of iron, steel, quicksilver, and corn; and a large quantity of linen is sent hence to Fiume and Triest. It is 26 miles west by north of Laubach, and 35 north of Triest. Lon. 14. 7. E. Lat. 46. 31. N.

LA'CKBRAIN. *s*. (*lack* and *brain*.) One that wants wit (*Shakspeare*).

LA'CKER. *s*. A kind of varnish, which, spread upon a white substance, exhibits a gold colour.

To LA'CKER. *v*. *a*. (from the noun.) To smear over with lacker (*Pope*).

LA'CKEY. *s*. (*laquais*, French.) An attending servant; a footboy (*Dryden*).

To LA'CKEY. *v*. *a*. (from the noun.) To attend servilely (*Milton*).

To La'ckey. *v*. *n*. To act as a footboy; to pay servile attendance (*Sandys*).

LA'CKLINEN. *a*. (*lack* and *linen*.) Wanting shirts (*Shakspeare*).

LA'CKLUSTRE. *a*. (*lack* and *lustre*.) Wanting brightness (*Shakspeare*).

LACONIA, or Laconica, a country on the southern parts of Peloponnesus, having Argos and Arcadia on the north, Messenia on the west, the Mediterranean on the south, and the bay of Argos at the east. Its extent from north to south was about 50 miles. It was watered by the river Eurotas. The capital was called Sparta, or Lacedæmon. The brevity with which the Laconians always expressed themselves is now become proverbial; and by the epithet of *laconic* we understand whatever is concise, and is not loaded with unnecessary words.

LACO'NIC. *a*. Short; brief (*Pope*).

LA'CONISM. *s*. (*laconisme*, Fr.) A concise style (*Collier*).

LACO'NICALLY. *ad*. (from *laconic*.) Briefly; concisely (*Camden*).

LACQUERS, are varnishes applied upon tin, brass, and other metals, to preserve them from tarnishing, and to improve their colour. The basis of lacquers is a solution of the resinous substance called *seed-lac* in spirit of wine. The spirit ought to be very much dephlegmated, in order to dissolve much of the lac. For this purpose, some authors direct dry potash to be thrown into the spirit. This alkali attracts the water, with which it forms a liquid that subsides distinctly from the spirit at the bottom of the vessel. From this liquid the spirit may be separated by decantations. By this method the spirit is much concentrated; but,

at the same time, it becomes impregnated with part of the alkali, which depraves its colour, and communicates a property to the lacquer of imbibing moisture from the air. These inconveniences may be prevented by distilling the spirit; or, if the artist has not an opportunity of performing that process, he may cleanse the spirit, in a great measure, from the alkali, by adding to it some calcined alum; the acid of which uniting with the alkali remaining in the spirit, forms with it a vitriolated tartar, which, not being soluble in spirit of wine, falls to the bottom together with the earth of the decomposed alum. To a pint of the purified spirit, about three ounces of powdered shell-lac are to be added; and the mixture to be digested during the same day with a moderate heat. The liquor ought then to be poured off, strained, and cleared by settling. This clear liquor is now fit to receive the required colour from certain resinous colouring substances, the principal of which are gamboge and annotto; the former of which gives a yellow, and the latter an orange colour. In order to give a golden colour, two parts of gamboge are added to one of annotto: but these colouring substances may be separately dissolved in the tincture of lac, and the colour required may be adjusted by mixing the two solutions in different proportions. When silver leaf or tin is to be lacquered, a larger quantity of the colouring materials is requisite than when the lacquer is intended to be laid on brass.

LACTANTIUS, (*Firmean*) an eloquent father of the church, was, according to some, an African, and to others, a native of Fermo in Italy. He studied under Arnobius, and became so famous as a rhetorician, that Constantine the emperor made him preceptor to his son Crispus. He formed his style upon the model of Cicero; but though he writes with the greatest purity and force, especially in confuting the heathens, yet he was not a profound divine. He blends too much philosophy with his theology, and does not steer quite free from error. His works were published at Rome in 1468, folio; but the best edition is that of Paris, 2 vols. 4to. 1748.

LA'CTARY, *a.* (*lactareus*, Lat.) Milky; full of juice like milk (*Brown*).

LA'CTARY. *s.* (*lactarium*, Latin.) A dairy house.

LACTA'TION. *s.* (*lacto*, Latin.) The act or time of giving suck.

LACTATS, (*Lactas, tis*, m.) Salts formed by the union of the acid of sour whey, or lactic acid, with different bases; thus *aluminous lactat*, *ammoniacal lactat*, &c.

LACTEALS. *Vasa lactea.* The absorbents of the mysentery, which originate in the small intestines, and convey the chyle thence to the thoracic duct. They are very tender and transparent vessels, possessed of an infinite number of valves, which, when distended with chyle, give them a knotty appearance. They arise from the internal surface of the villous coat of the small intestines, perforate the other coats, and form a kind of net work, whilst the greater number unite one with another between the muscular and external coats. Thence they proceed between the laminæ of the mesentery to the conglobate glands. In their course they constitute the greater part of the gland through which they pass, being distributed through them several times, and curled in various directions. The lacteals having passed these glands, go to others, and at length seek those nearest the root of the mesentery. From these glands, which are only four or five, or perhaps more, the lacteals pass out and ascend with the mesenteric artery, and unite with the lymphatics of the lower extremities, and those of the abdominal viscera, and then form a common trunk, the *thoracic duct*, which in some subjects is delated at its origin, forming the *receptaculum chyli.*

LA'CTEAL. *a.* (from *lac*, Lat.) Milky; conveying chyle of the colour of milk (*Locke*).

LA'CTEAL. *s.* The vessel that conveys chyle (*Arbuthnot*).

LA'CTEOUS. *a.* (*lacteus*, Latin.) 1. Milky (*Brown*). 2. Lacteal; conveying chyle (*Bentley*).

LACTE'SCENCE. *s.* (*lactesco*, Latin.) Tendency to milk, or milky colour (*Boyle*).

LACTE'SCENT. *a.* (*lactescens*, Lat.) Producing milk, or a white juice (*Arbuthnot*).

LACTIC ACID. See MILK.

LACTI'FEROUS. *a.* (*lac* and *fero*. Latin.) What conveys or brings milk (*Ray*).

LACTU'CA. Lettuce. In botany, a genus of the class syngenesia, order polygamia equalis. Receptacle naked; calyx imbricate, cylindrical, with a membraneous margin: down simple, pedicelled; seeds unarmed. Twenty-one species: almost all European plants; but a few indigenous to South America: three common to the wastes, hedges, or old walls of our own country.

The following are those chiefly cultivated in our own gardens as esculents.

1. Common Garden Lettuce.
2. Cabbage Lettuce.
3. Cilicia Lettuce.
4. Dutch Brown Lettuce.
5. Aleppo Lettuce.
6. Imperial Lettuce.
7. Green Cappuchin Lettuce.
8. Versailles, or upright white Cos Lettuce.
9. Black Cos Lettuce.
10. Common White Cos Lettuce.
11. Red Cappuchin Lettuce.
12. Roman Lettuce.
13. Prince Lettuce.
14. Royal Lettuce.
15. Egyptian Lettuce.

Of these the first is common in all gardens, and is usually sown for eating very young, to mix with other sallad herbs in spring. It may be sown in all seasons of the

year, but in shady borders during the hot months the cabbage lettuce should also be sown at different seasons to have a continuation through the summer. The first crop should be sown in February, in an open situation; the others at the interval of three weeks. But the latter crops should be sown under cover, though not under the drippings of trees. The Cilicia, Imperial, Royal, black, white, and upright Cos Lettuces, may be sown first in the latter end of February, or beginning of March, on a warm, light soil, and in an open situation. When the plants rise they must be thinned to fifteen inches distance every way; they will then require no farther care than that of keeping them clear of weeds; and the black Cos, as it grows large, should have its leaves tied together to whiten the inner part. Succeeding crops of these should be sown in April, May, or June, and toward the end of August they may be sown for a winter crop, to be preserved under glasses, or in a bed arched over with hoops, and covered with mats. The most valuable of all the English Lettuces are the Egyptian Green Cos, and the Versailles, or White Cos, the Cilicia, and Black Cos. The Brown, Dutch, and the Green Capuchin are very hardy, and may be sown late under walls, where they will stand the winter, and be valuable when no others are to be had. The Red, Capuchin, and Prince Lettuces are very early kinds, and are sown for variety, as are also the Aleppo ones, for the beauty of their spotted leaves. In obtaining the seeds of Lettuces, care should be taken never to let two sorts stand too near each other, because their farina mixing together, they will be apt to vary from their original, and partake of each other; a stake should be fixed down by the side of each plant, to which they should be fastened, in order to prevent their being broken, or blown out of the ground by the wind.

In medicine the Lactica graviosa or opium scented lettuce, has been strongly recommended and often employed as a sedative and narcotic. It was first noticed by Dioscorides; has been since extolled by Halle, and of late so warmly by Dr. Collin of Vienna, as to have been introduced into the Materia Medica of the Royal College of Edinburgh, under the name of Lactuca Graveolens. The dose is from eighteen to thirty grains a day, and it is said to have been found highly successful in attenuating vicid humours and promoting secretions. Yet other German physicians have not found the benefits from its use attributed to it by Dr. Collin: and hence in England it has hitherto been regarded as of too doubtful a character to be relied on.

It is found on the hedges and old walls of our own country. Leaves horizontal, prickly, on the keel, obtuse at the top, arrow shaped at the base, oblong, lanceolate; the lower leaves sinuate and denticulate.

LACUNÆ, (*Lacuna, æ, f.* from *lacus*, a channel). In anatomy. The mouths or openings of the excretory ducts of the muciparous glands of the urethra.

LACUNAR, in architecture, an arched roof, or ceiling. The term is often restricted to denote the planking or flooring above porticos and piazzas.

LACUNOSE LEAF. In botany. *Lacunosum folium. Disco depresso inter venas interjectas.* When the disk is depressed between the veins. Contrary to *rugose*, wrinkled, in which it rises.

LACY (John), an English actor and play writer in the reign of Charles II. with whom he was a great favourite. His plays are 1. The Dumb Lady; 2. The Old Troop, or Monsieur Ragou; 3. Sir Hercules Buffoon.

LACYDES, a Greek philosopher of Cyrene, and disciple of Arcesilaus, whom he also succeeded as master of the second academy. Attalus gave him a garden in which to read his lectures. He foolishly mourned the loss of a favourite goose, and had the creature buried magnificently. He died of intemperance, B. C. 212.

LAD. s. (leoꝺe, Saxon.) 1. A boy; a stripling, in familiar language (*Watts*). 2. A boy; a young man, in pastoral language (*Spenser*).

LADANUM, (*Ladanum, i,* n. λάδανον; from *ladon*, Arab.) *Labdanum.* This resinous juice exudes upon the leaves of the *Cistus creticus; aborescens exstipulatus, foliis, spatulato ovatis petiolatis enerviis scabris, calycinis lanceolatis* of Linnéus. In Canada, the inhabitants collect it by lightly rubbing the leaves with leather, and afterwards scraping it off and forming it into irregular masses for exportation. Three sorts of ladanum have been described by authors, but only two are to be met with in the shops. The best, which is very rare, is in dark-coloured masses, of the consistence of a soft plaster, and growing still softer on being handled; the other is in long rolls, coiled up, much harder than the preceding, and not so dark. The first has commonly a small, and the last a large admixture of fine sand, without which they cannot be collected pure, independently of designed abuses; the dust blown on the plant by winds from the loose sands among which it grows, being retained by the tenacious juice. The soft kind has an agreeable smell, and a lightly pungent bitterish taste: the hard is much weaker. Ladanum was formerly much employed internally as a pectoral and adstringent in catarrhal affections, dysenteries, and several other diseases; at present, however, it is wholly confined to external use, and is an ingredient in the stomachic plaster, *emplastrum ladani* of the London Pharmacopoeia. See Cistus.

LA'DDER. s. (hlæꝺꝺre, Saxon.) 1. A frame made with steps placed between two upright pieces (*Prior*). 2. Any thing by which one climbs (*Sidney*). 3. A gradual rise (*Swift*).

La'dder *Jacob*, in Botany. See Polemonium.

La'dder *to Heaven*. See Convallaria.

LADE. *s.* The mouth of a river, from the Saxon laðe, which signifies a purging or discharging (*Gibson*).

To LADE. *v. n.* preter. *laded*; part. passive, *laded* or *laden*. (hlaðen, Saxon.) 1. To load; to freight; to burden (*Bacon*.) 2. (hlaðan, to draw, Saxon.) To leave out; to throw out (*Temple*).

LADENBURGH, a town of Germany, in the palatinate of the Rhine, seated on the Neckar, eight miles north-west of Heidelberg. Lon. 8. 42. E. Lat. 49. 30. N.

LA'DING. *s.* (from *lade*.) Weight; burden (*Swift*).

LA'DE. *s.* (hlaðle, Saxon.) 1. A large spoon; a vessel with a long handle, used in throwing out any liquid from the vessel containing it (*Prior*). 2. The receptacle of a mill-wheel, into which the water falling turns it.

LADOGA, a lake in Russia, between the gulf of Finland and the lake of Onega. It is 150 miles long and 90 broad, and esteemed to be the largest lake in Europe. Among the fish with which it abounds, are seals. It is full of quicksands, which, being moved from place to place, by the frequent storms, cause several shelves which often prove fatal to the flat bottomed vessels of the Russians. This induced Peter the Great to cut a canal 67 miles in length, from the south-west extremity of this lake to the river Neva, by which it has a communication with the gulf of Finland.

Ladoga, New, a town in the Russian government of Petersburgh, seated on the Volkhof, between the lake and canal of Ladoga. Old Ladoga, an inconsiderable place, is higher up the Volkhof. New Ladoga is 70 miles east of Petersburgh. Lon. 30. 32. East. Lat. 60. 0. N.

Ladogna, or Lacedogna, a town of Naples, in Capitanata, with a bishop's see, 60 miles east of Naples. Lon. 15. 46. E. Lat. 41. 1. N.

LADRONE Islands, islands of the north Pacific Ocean. They are 11 in number, exclusive of the small islets and rocks, lying in 140. E. lon. and between 11 and 28. N. lat. They were discovered by Magellan, in 1521. He touched first at the island of Guam, where the natives stole some of his goods, which caused him to name these islands the the Ladrones, or Islands of Thieves. Beside the other fruits natural to the soil and climate, here is the bread-fruit tree in abundance. The names of the principal islands are Laypan, Linian, Guam, and Rora.

LADY, a title derived from two Saxon words, which signify *loaf-day*, which words have in time been contracted into the present appellation. It properly belongs only to the daughters of earls, and all of higher rank; but custom has made it a word of complaisance for the wives of knights and gentlemen. As to the original application of this expression, it may be observed, that heretofore it was the fashion for those families, whom God had blessed with affluence, to live constantly at their mansion houses in the country, and that once a-week, or oftener, the lady of the manor distributed to her poor neighbours, with her own hands, a certain quantity of bread. But the practice, which gave rise to this title, is now as little known as the meaning of it: however, it may be from that hospitable custom, that to this day the ladies in this kingdom alone serve the meat at their own table.

Lady *day*, in Law and Chronology, the 25th of March, being the supposed anniversary of the annunciation to the Virgin Mary.

Lady-*bird*, or Lady-cow, in Entomology. See Coccinella.

Lady's *Bedstraw*, in Botany. See Galium.

Lady's *Bower*. See Clematis.

Lady's *Comb*. In botany. See Scandix.

Lady's *Cushion*. In botany. Saxifraga.

Lady's *Finger*. In botany. See Anthyllis.

Lady's *Mantle*. In botany. See Alchemilla.

Lady's *Seal*. In botany. See Tamus.

Lady's *Slipper*. In botany. See Cypripedium.

Lady's *Smock*. In botany. See Cardamine.

Lady's *Traces*, Triple. In botany. Ophrys.

LADY-LIKE. *a.* Soft; delicate; elegant; (*Dryden*).

LADYSHIP. *s.* The title of a lady.

LÆLIUS (Caius), a Roman consul and great orator, surnamed the Wise, distinguished himself in Spain in the war against Viriathus the Spanish general. He is highly praised by Cicero, who gives an admirable description of the intimate friendship which subsisted between Lælius and Scipio Africanus the younger. His eloquence, his modesty, and his abilities, acquired him a great reputation; and he is thought to have assisted Terence in his comedies. He died about 126 B. C.

LÆNA, in antiquity, was a gown worn by the Roman augurs, and peculiar to their office. In this gown they covered their heads when they made their observations on the flight of birds, &c. See Augur.

LÆSION, (from *lædo* to injure.) In surgery and medicine, a hurt whether external or internal.

LÆSTRYGONES, the most ancient inhabitants of Sicily.

LÆTIA. In botany a genus of the class polyandria, order monogynia. Calyx five leaved; petals five or none; front one-celled, three-sided, seeds with a pulpy coat. Four species, natives of the West Indies or Ame-

rica, of these the most celebrated is, L. apetala; gum-wood; petalless; peduncled mostly three-flowered, axillary; leaves oblong, obtuse, serrulate, shining. It is an American tree with white hawthorn-like flowers: the stem rises to a considerable height and is richly impregnated with a resin, which exudes on exposure to a strong heat of the sun, and in appearance resembles sandarach. The natives powder and convert it into pounce. It appears to possess the common properties of other terebinthinates.

LÆVIUS, a Latin poet. It is not well known when he lived, but probably he was more ancient than Cicero. He wrote a poem entitled Erotopagnia, i. e. love games. Aulus Gellius quotes two lines of it. Apuleius also quotes six lines from the same poet; but he does not tell from what work he borrowed them. Lævius had also composed a poem entitled, The Centaurs, which Festus quotes under the title of Petrarum.

LAG. *a.* (*lagg*, Swedish, the end.) 1. Coming behind; falling short (*Carew*). 2. Sluggish; slow; tardy (*Dryden*). 3. Last; ong delayed (*Shakspeare*).

Lag. *s.* 1. The lowest class; the rump; the fag end (*Shakspeare*). 2. He that comes last, or hangs behind (*Pope*).

To Lag. *v. n.* 1. To loiter; to move slowly (*Dryden*). 2. To stay behind; not to come in (*Swift*).

LAGERSTRŒMIA. In botany, a genus of the class polyandria, order monogynia. Calyx six-cleft, campanulate; petals six; stamens numerous, the six outer ones thicker; capsule four or six-celled, many seeded. Five species, all trees of India or China.

LAGGER. *s.* (from *lag.*) A loiterer; an idler.

LAGNASCO, a town of Piedmont, 24 miles S. of Turin.

LAGNY, a town of France, in the department of Seine and Marne, with a late famous Benedictine abbey; seated on the Marne, 15 miles E. of Paris. Lon. 2. 45. E. Lat. 48. 50. N.

LAGNY (Thomas Fantet de), an eminent French mathematician, was born at Lyons. Fournier's Euclid, and Pelletier's Algebra, by chance falling in his way, developed his genius for the mathematics. It was in vain that his father designed him for the law; he went to Paris to deliver himself wholly up to the study of his favourite science. In 1697, the Abbé Bignon, protector-general of letters, got him appointed professor-royal of Hydrography at Rochfort. Soon after, the duke of Orleans, then regent of France, fixed him at Paris, and made him sub-director of the General Bank, in which he lost the greatest part of his fortune in the failure of the Bank. He had been received into the ancient academy in 1696; upon the renewal of which he was named Associate-geometrician in 1699, and pensioner in 1723. After a life spent in close application, he died, April 12, 1734.

In the last moments of his life, and when he had lost all knowledge of the persons who surrounded his bed, one of them, through curiosity, asked him, what is the square of 12? To which he immediately replied, and without seeming to know that he gave any answer, 144.

De Lagny particularly excelled in arithmetic, algebra, and geometry, in which he made many improvements and discoveries. He, as well as Leibnitz, invented a binary arithmetic, in which only two figures are concerned. He rendered much easier the resolution of algebraic equations, especially the irreducible case in cubic equations; and the numeral resolution of the higher powers, by means of short approximating theorems.—He delivered the measures of angles in a new science, called Goniometry; in which he measured angles by a pair of compasses, without scales, or tables, to great exactness; and thus gave a new appearance to trigonometry.—Cyclometry, or the measure of the circle, was also an object of his attention; and he calculated, by means of infinite series, the ratio of the circumference of a circle to its diameter, to 120 places of figures. He gave a general theorem for the tangents of multiple arcs. With many other curious or useful improvements, which are found in the great multitude of his papers, that are printed in the different volumes of the Memoirs of the Academy of Sciences, viz. in almost every volume, from the year 1699, to 1729. (*Hutton's Dict.*)

LAGOECIA. Bastard cumin. In botany, a genus of the class pentandria, order monogynia. Involucre universal and partial; petals bifid; seeds solitary, inferior. One species, an annual of the Levant.

LAGOON Island, a small island in the South Sea, discovered by Captain Cook, in April 1769. Lon. 139. 28. W. Lat. 18. 47. S.

LAGOPHTHALMUS, (*Lagophthalmus, i.* m. λαγοφθαλμος, from λαγος, a hare, and οφθαλμος, an eye, because it is believed that hares sleep with their eyes open.) In medicine a want of power to close the eyelid. It may arise from spasm, palsy, atony, or fissure of the muscles of the eye-lids, and a variety of other causes.

LAGOPUS, in ornithology. See Tetrao.

LAGOS, a seaport of Portugal, in Algarva, with a castle. Here the English fleets bound to the straits usually take in fresh water. Near this town is Cape Lagos, off which, in 1759, admiral Boscawen defeated a French fleet. It is 120 miles S.E. of Lisbon. Lon. 8. 33. W. lat. 36. 54. N.

LAGRIA. In entomology, a Fabrician tribe of the coleopterous genus *Cryptocephalus*, which see.

LAGRISMOSO, in music, an Italian term, used to signify a plaintive manner of singing or playing.

LAGUNA, the capital town of Teneriffe, situated in Lon. 16. 18. W. Lat. 28. 29. N.

LAGUNŒA. In botany, a genus of the class monadelphia, order polyandria. Calyx single, five-cleft; style five-cleft; capsule five-celled, five-valved, with the partition contrary. Three species; shrubs of the Isle Bourbon, of Senegal and Coromandel; the last with yellow flowers, and red, peltate stigma.

LAGUNES OF VENICE, the marshes or lakes in Italy, on which Venice is seated. They communicate with the sea, and are the security of the city. There are about 60 islands in these Lagunes, which together make a bishop's see. Eurano is the most considerable, next to those on which Venice stands.

LAGURUS. Hare's-tail-grass. In botany, a genus of the class triandria, order digynia. Calyx two-valved, one flowered, with a villous awn; outer glume of the corol with two terminal awns, and a twisted awn on the back. One species: with ovate spike; lanceolate, acutely-nerved leaves. Found in the sandy fields of our own country.

LAHN, a river of Germany, which rises in Hesse Cassel, and flowing by Marpurg, Wetzlar, and Nassau, falls into the Rhine, above Coblentz.

LAHOLM, a seaport of Sweden, in the province of Halland, seated near the Baltic, with a castle, 50 miles N. of Copenhagen. Lon. 12. 40. E. Lat. 56. 31. N.

LAHOR, a large town of Asia, in Industan, and capital of a province of the same name, and one of the most considerable in the Mogul's dominions. It is of a vast circumference, and contains a great number of mosques, public baths, caravanseras, and pagods. It was the residence of the Great Mogul; but since the removal of the court, the fine palace is going to decay. There is a magnificent walk of shady trees, which runs from this to Agra, that is upwards of 300 miles. Here they have manufactures of cotton cloths and stuffs of all kinds, and they make very curious carpets. East long. 75. 55. North lat. 31. 40.

LAIC, the term often used by lawyers for a layman.

LA'ICAL. *a.* (*laique*, French; *laicus*, Lat. λάϊκος.) Belonging to the laity, or people, as distinct from the clergy (*Camden*).

LAID. Preterit participle of *lay* (*Swift*).

LAIN. Preterit participle of *lie* (*Boyle*).

LAIR. *s.* (*lai*, French.) The couch of a boar, or wild beast (*Milton*).

LAIRD. *s.* (hlaford, Saxon.) The lord of a manor in the Scottish dialect (*Cleaveland*).

LAIRESSE (Gerard), a celebrated painter, was born at Liege in 1640. He studied under his father, but formed his style after Poussin and Bartolet. He resided a considerable time at Utrecht little known or esteemed, till one of his pictures being bought by a picture merchant at Amsterdam, he prevailed with him to go to that city, where he rose to affluence and reputation. The manner of his working was singular, for when his employer placed an easel before him, expecting to see him begin to design, Lairesse sat down before the canvas, and appearing contemplative for a few minutes, he pulled out a violin, which he usually carried about him, and began to play; then, suddenly laying aside the instrument, he sketched a design of the nativity, and immediately resumed the violin; till having unbent his mind for awhile with the music, he pursued his work, painting and playing alternately, and in two hours completed the heads of Mary, Joseph, and the infant Christ, as also the ox, and all so well finished as to astonish the spectators. He had the misfortune to lose his sight before he died. His greatest pictures are the history of Heliodorus, and young Moses trampling on the crown of Pharaoh. He died at Amsterdam in 1711. Lairesse wrote an excellent book upon his art, which has been translated into English. He had three sons, of whom two were painters. He had also three brothers in that line, Ernest, James, and John. James excelled in flower painting, and the two others in painting animals.

LAIS, a celebrated courtezan, daughter of Timandra, the mistress of Alcibiades, born at Hyccara in Sicily, was carried into Greece, when Nicas the Athenian general invaded Sicily. She first resided at Corinth, where she sold her favours for 10,000 drachmas, and was visited by princes, noblemen, philosophers, orators, &c. The expenses which attended her pleasures, gave rise to the proverb of Non cuivis homini contingit adire Corinthum. She next went to Thessaly, where the women, jealous of her personal charms, and apprehensive of her corrupting the fidelity of their husbands, assassinated her in the temple of Venus, about 340 years before the Christian era.

The conduct of Demosthenes in regard to Lais is worth recording. He went secretly to Corinth, on purpose to spend a night with her; but, Lais having demanded 10,000 drachmas, he returned back, saying, "he would not buy repentance at so dear a rate."

LA'ITY. *s.* (λάϊκος.) 1. The people, as distinguished from the clergy (*Swift*). 2. The state of a layman (*Ayliffe*).

LAKE. *s.* (*lac*, French; *lacus*, Latin.) 1. A large diffusion of inland water (*Dryden*). 2. A small plash of water.

LAKE (from *lac*, an insect, which see) a beautiful red or crimson pigment which may be defined to be an intimate combination of colouring extract with an earth or metallic oxyd formed by precipitation from the solution of the colouring matter. It is generally obtained from cochineal or the dried substance of the coccus cacti; though it may be also procured from mad-

der and Brazil-wood. The process by which it is obtained from cochineal gives also carmine at the same time; but the preparation is endeavoured to be kept a profound secret, at least that nicety of manipulation upon which the perfection of either of these colouring materials depends. Under the article carmine we have given one mode of operation, and we shall in the present place offer a second, as forming the best plan of working both for carmine and lake at the same time.

Into a fourteen gallon boiler of well tinned copper, put ten gallons of distilled or very clear river or rain-water, for few spring waters will answer the purpose. When the water boils sprinkle in by degrees a pound of fine cochineal previously ground in a stone mortar to a moderately subtile powder; keep up a temperate ebullition for about half an hour, and then add three ounces and a half of crystallized carbonat of soda: in a minute or two afterwards draw the fire, and then add to the liquor an ounce and a half of Roman alum very finely pulverized: stir the mass with a clean stick till the alum is dissolved, then leave it to settle for twenty-five minutes; draw off the clear liquor with a glass syphon, and separate the sediment from the residue by straining it through a close cloth of linen. Replace the clear liquor in the boiler, and stir in the whites of two eggs previously well beaten with a quart of warm water: then light the fire again and heat the liquor till it begins to boil, at which time the albumen of the eggs will coagulate and combine with the earth of the alum and the finest part of the colouring matter. This sediment is the *carmine*, which being separated by filtration and well-washed on the filter with distilled water, is to be spread very thin on an earthern plate, and slowly dried in a stove, after which it is ready for use.

The finest part of the colouring matter being thus separated, the residue may be employed in the preparation of red lake in the following manner: add two pounds of pearl-ash to the red liquor from which the carmine was precipitated and return it into the boiler together with the dregs of the cochineal, and boil the whole gently for about half an hour; then draw the fire, and after the sediment has subsided, drain off all the clear liquor into wooden or earthenware vessels, the latter are best. Then pour upon the sediment a second alkaline lay, prepared by dissolving a pound of pearl-ash in two gallons of water, and boil this also upon the dregs for half an hour, by which process the whole of the colouring matter will be exhausted. Separate by filtration the liquor from the dregs, and return both the alkaline solutions into the copper. When this bath is as hot as the hand can bear, add by degrees three pounds of finely powdered Roman alum, observing not to add a second portion till the effervescence from the first has entirely subsided When the whole of the alum has been put in, raise the fire till the liquor simmers, and continue it at this temperature for about five minutes, at which time if a little is taken out and put into a wine-glass it will be found to consist of a coloured sediment diffused through a clear liquor. After standing quiet a while the greater part of the clear supernatant liquor may be poured off, and the residue being placed on the filter, the coloured *lake* will be deposited, which must be washed with clear rain water. A pound of good Mexican cochineal will afford an ounce and a half of carmine, and about a pound and a quarter of red lake.

LAKEWEED. In botany. A term applied to one or two of the species of the polygonum, which see.

LALANDE (Joseph Jerome le Français de) an eminent French astronomer, member of the legion of honour of the Institute, of the board of longitude, professor of astronomy in the college of France, was born at Bourg, in the department of l'Ain, on July 11, 1732, of respectable parents. He was destined to the bar, and came to Paris for the study of jurisprudence, when the view of the observatory developed to him a propensity which deranged his father's plans, and became the ruling passion of his life. He was kindly received by the celebrated astronomer le Monnier, from whose lessons he profited in such a manner as to acquire his affectionate regard and esteem. So rapid was his advance, that at the age of 19 he was nominated, through the recommendation of le Monnier, the commissioner of the Academy of Sciences, to go to Berlin, in order to determine the parallax of the moon, in concert with M. Lacaille, who was to perform the same operation at the Cape of Good Hope. The account of his mission which he gave at his return opened to him the doors of the Academy, from which time to the period of its suppression there was not a single volume of its transactions in which an important memoir of his did not appear. The active part which he took in the labours of the academy was not limited to astronomical observations. He published the French edition of Halley's Tables, and the History of the Comet of 1759; and he furnished Clairault with immense calculations for the theory of that famous comet. Being charged in 1760 with the compilation of the "Connoissance des Temps," he entirely changed the form of the work, and gave it that which it bears at present. Of this collection he published 32 volumes, viz. from 1775 to 1807 inclusive.

In 1764 appeared the first edition of his great "Traité Astronomique," a classical work, which he has since perfected. He composed all the astronomical articles for

the Yverdun Encyclopedia, and new cast the whole for the Encyclopedie Methodique.

To his written lessons he joined, during 46 years, oral instructions. In 1761, he succeeded his first master Delille in the astronomical chair at the college of France; and he taught with so much ability that his school became a seminary of disciples who peopled the observatories. In the midst of his labours he drew up his "Voyage d'Italie," which is the most complete collection of curious objects that travellers can consult; his "Traité des Canaux;" and his "Bibliographie Astronomique," a vast catalogue of all the works which have appeared on this science.

Associated to all the distinguished scientific societies, he was their common bond of union by the correspondences which he maintained, and promoted a circulation of intelligence from one to another. He employed the credit arising from the universal reputation he enjoyed, for the general benefit of the sciences and their cultivators.

To the extraordinary ardour and activity of his character he joined a love for truth which approached the borders of fanaticism. Every degree of concealment appeared to him unworthy of an honest man; and he therefore, without any reserve, uttered his sentiments on all occasions. It may easily be conceived, that in his long career, and while he sometimes assumed the tone of superiority, which he thought justified by his long services, he would wound the self-love of more than one individual; but he was sensible of the fault, and endeavoured to repair it. The high consideration which he obtained would probably, with prudence and circumspection, have secured him an enviable lot to the end of his days; but the habit of speaking his mind, which he did not lay aside in the most stormy times, and upon topics where he might, nay ought to have been silent, together with the bluntness with which he sometimes refuted the established systems of others, animated against him a crowd of detractors, who proceeded so far as to call in question his undoubted merits. His long and durable services in matters of science, were thus in a measure forgotten or lost sight of in the contemplation of his dangerous speculations, and of the imprudent zeal with which he promulgated his opinions. Those who knew him well, affirm, that if any of the French infidels of late times was decidedly an atheist, Lalande was doubtless such: and, that atheistical opinions when embraced by a man of excessive garrulity and overweening vanity, would be injurious in their effects both upon himself and upon others, needs no proof. He was, in fact, as much noted for his profaneness as for his talents: a species of distinction which we hope few other astronomers will emulate.

In 1802, M. Lalande published a new edition of Montucla's History of Mathematics, in 4 vols. 4to.: the two latter volumes being prepared from Montucla's papers, with the assistance of Laplace, Lacroix, and others of the French mathematicians. The fourth volume has for a frontispiece the portrait of Lalande, with the following motto:

——"Du Ciel devenu son Empire
Son Génie a percé les vastes profondeurs;
Mais il règne encor sur nos ceurs,
Et nous l'aimons autant que l'univers l'admire."

In the year 1793, M. Lalande published "Abrégé de Navigation historique, theorique, et pratique," containing many valuable rules, and tables. The "Connoissance des Temps," from the year 7 to 12, 1799 to 1804 contains his new catalogue of more than 12,000 stars. A few years before his death, viz. in 1802, he published a little collection for the pocket of Tables of Logarithms, Sines and Tangents, upon the plan of Lacaille, but much inferior to them. We query, however, whether Laplace thinks half so highly of his "Mecanique Celeste," as poor Lalande did of this meagre book of tables. During the latter years of his life he published annually a concise history of astronomy for the current year, which exhibited a summary of the most remarkable facts, discoveries, and inventions, connected with the subject, and at the same time exhibited all the characteristic traits of the author's gossiping and vanity. Lalande died at Paris, April 4th, 1807, in the 75th of his age.

He was an excellent astronomer, and an active promoter of astronomical science; but he had very little taste, and a very confined knowledge of mathematics in general. He considered himself however, as the father of the mathematical sciences generally; and at his death he founded the prize of a medal, which the Institute annually awards to the author of the best astronomical memoir, or the maker of the most curious observation.

LAMA, in mastiology. See CAMELUS.

LAMA, the sovereign pontiff, or rather god, of the Asiatic Tartars, inhabiting the country of Barantola. The lama is not only adored by the inhabitants of the country, but also by the kings of Tartary, who send him rich presents, and go in pilgrimage to pay him adoration, calling him *lama congiu*, i. e. "god, the everlasting father of heaven." He is never to be seen but in a secret place of his palace, amidst a great number of lamps, sitting crossed-legged upon a cushion, and adorned all over with gold and precious stones; where at a distance they prostrate themselves before him, it not being lawful for any to kiss even his feet. He is called the *great lama*, or *lama of lamas*; that is, "priest of priests." The orthodox opinion is, that when the grand lama seems to die either of old age or infirmity, his soul

in fact only quits a crazy habitation to look for another younger or better; and it is discovered again in the body of some child, by certain tokens known only to the lamas or priests, in which order he always appears.

LAMANON (Robert Paul), of the academy at Turin, correspondent of the Academy of Sciences at Paris, and member of the Museum in the same city, was born at Salon in Provence, in 1752, of an old and respectable family. Being a younger son, he was destined for the church, and sent to Paris to complete his theological studies; but getting acquainted with the philosophers (as they called themselves), he soon lost all relish for the study of theology, and devoted himself to the physical sciences, especially those of chemistry and mineralogy. Into the church, however, he got, and rose to the dignity of canon; but by the death of his father and elder brother, having acquired the right of directing his own future exertions, he hastened to quit a profession, towards which he felt no partiality.

Thus liberated from the trammels of his former profession, Lamanon applied himself with uncommon ardour to study. Eager to raise the awful veil that conceals from our eyes the secrets of nature; persuaded, that even the greatest genius only amuses itself with false systems in the silence of a cabinet; convinced of the necessity of much and various observation, and of surprising Nature, as it were, in the very fact, in order to penetrate into the sublimity of her operations;—our young philosopher travelled through Provence and Dauphine, and scaled the Alps and Pyrenees. At the sight of these vast natural laboratories the bent of his mind burst forth instantaneously: he climbed to the summit of rocks, and explored the abyss of caverns, weighed the air, analysed specimens, and, in this ardent fancy, having attained the secrets of creation, he formed a new system of the world. On his return home, he applied with additional interest to the study of meteorology, mineralogy, natural philosophy, and the other branches of the history of nature.

Whilst he was meditating a visit to Paris for the purpose, as his eulogist expresses himself, of conversing with the luminaries of science, the inhabitants of the commune of Salon, having lost a cause against their lord, unanimously elected Lamanon, with whose integrity and abilities they were well acquainted, to go and solicit of the council the repeal of an unjust decree that had been obtained by partiality. The reply of the young philosopher on this occasion is an additional proof of his uncommon disinterestedness. "As I intend (said he) to go to Paris on business of my own, I cannot think of accepting your offer of 24 livres daily pay: a twelfth of this sum will cover the extraordinary expenses of the journies that I shall be obliged to make to Versailles on your account." He had the satisfaction of complete success in the business thus undertaken.

Convinced that the friendship of an eminent man elevates the soul, excites generous emulation, and becomes an additional stimulus to one whose delight is study, and whose most pressing want is an object on which to place his affection, Lamanon anxiously endeavoured to merit the regard of Condorcet, so well known by his talents, his impieties, his rebellion, and his misfortunes. This academician, justly considering that an apostate priest would be ready to join the conspiracy of the philosophists against the altar and the throne, received Lamanon with distinction, and at length admitted him to his most intimate friendship.

During the three successive years that Lamanon spent at Paris, he followed with care the track of those learned societies, of which he had been elected a member. He became at this period, together with Count de Gebelin, and some other philosophers and artists, one of the founders of the Museum, the greater part of the members of which are now reunited in the open society of sciences, letters, and arts, at Paris. Among the different papers of his that were read at various meetings of these societies, Ponce mentions with particular approbation what he calls *a notice* of Adam de Crapone, an eminent hydraulic engineer; a memoir on the Cretins; a memoir on the theory of the winds; a treatise on the alteration in the course of rivers, particularly the Rhone; and another on an enormous bone belonging to some cetaceous fish, that was dug up at Paris, in laying the foundations of a house in the *rue Dauphine*. We have not seen these memoirs; but as their author was the friend of Condorcet, and fancied that he had attained the secrets of creation, we can easily conceive their tendency.

Having resolved again to revisit Switzerland and Italy, Lamanon first went to Turin, where he allied himself to the learned of that country. During his stay there, the brilliant novelty discovered by Montgolfier was occupying the attention of all the philosophers of Europe. Lamanon, desirous of making some experiments of this kind himself, ascended in a balloon from the city of Turin; but not perceiving in this discovery, which had at first highly interested him, an object of public utility; not foreseeing, that one day, on the plains of Fleurus, it would be the cause of rallying and establishing victory under the standards of France, he returned to his favourite occupations. Pursuing his route from Piedmont, he visited Italy, and returned by Switzerland, where he explored the Alps and ascended the summit of Mont Blanc: thence returning, laden with the spoils of the countries which he had traversed, to Provence, he

employed himself in the arrangement of the interesting fruits of his journey.

Of the scrupulous exactness of his observations, his eulogist gives the following instance: "Being convinced that the plain of Crau, divided by the channel of the Durance, had formerly been a lake, he wished to be absolutely assured of it. For this purpose he collected a specimen of each of the stones that are to be found in this vast plain; the number of these he found to amount to nineteen; then tracing the course of the river towards its head, near the frontiers of Savoy, he observed, that above each junction of the tributary streams with the Durance, the variety of pebbles diminished. Afterwards ascending the current of each of these smaller streams, he discovered on their banks the original rock of every pebble that overspreads the plain of Crau; thus incontestably proving, that this plain was anciently a lake formed by the waters of the Durance, and the streams that fall into it. If all philosophers (says our author) would conduct their examinations with equal precision, certain hypotheses, more brilliant than solid, would not find so many admirers; the charm of imagination, and the graces of style, would not so often encroach upon the imprescriptible rights of nature and truth."

To citizen Ponce this appears a demonstration of Lamanon's theory; but we cannot say that it does so to us. It may be a kind of proof, though not a demonstration, that in some convulsion of nature, stones had been rolled from the rock, and the plain of Crau, for a time, overflowed by the Durance; but it surely furnishes no evidence of that plain's having ever been a permanent lake. It may have been so; but such investigations as this will not guard philosophers against the delusions of favourite hypotheses.

It was at the time when Lamanon was preparing for the press his great work on the Theory of the Earth, that the French government conceived the vast project of completing the discoveries of Captain Cooke: the academy of sciences was entrusted with the care of selecting men capable of rectifying our notions of the southern hemisphere, of improving hydrography, and advancing the progress of natural history. Condorcet, not knowing any one better qualified for this last department than Lamanon, wrote to him an invitation to share the danger and glory of this great enterprize. He accepted with eager transport a proposal that fulfilled his highest expectations, hastened to Paris, refused in a conference with the minister the salary that was offered, took a hasty leave of his friends, and departed for Brest.

On the 1st of August 1785, the armament set sail under the orders of La Pérouse, an experienced commander, whose patriotism and scientific zeal were equal to his courage and good sense, and who had already merited the public confidence. The philosophers of all Europe were in expectation of those useful discoveries, the probable fruit of the zeal and talents employed in the expedition. The beginning of the voyage was prosperous. After various delays, and a multitude of observations, the two vessels arrived at the island of Maouna, one of the southern Archipelago. The impatient Lamanon, eager to assure himself of the truth of the published accounts of that country, debarked with Langle, the second in command. At the moment of their return, the natives, in hopes of booty, which had been excited by the number of presents that they had received, seized upon the boats, and attacked the party. The French were obliged to have recourse to arms for self-defence, and a desperate combat ensued. Lamanon, Langle, and ten of the two boats' crews, fell a sacrifice to the fury of these barbarians.

Thus perished Lamanon, a young man ardent in the pursuits of science, to a high degree disinterested and a zealot in what he thought the cause of liberty. He refused the salary which was allotted to him when he was appointed to this unfortunate expedition; for "if I do not feel satisfied (said he) on board the vessel; if my inclination or curiosity lead me to quit the ship,—I should be unhappy if any power in the world had acquired the right of preventing me."

According to M. Ponce, Lamanon seemed born to bring about a revolution in science: the depth of his ideas, the energy of his character, the sagacity of his mind, united to that lively curiosity that can draw instruction out of any thing, and leaves nothing unexplored, would have led him to the most valuable discoveries.

LAMB. *s.* (*lamb*, Gothic and Saxon.) 1. The young of a sheep (*Pope*). 2. Typically, the Saviour of the world.

LAMB'S LETTUCE, in botany. See VALERIANA.

LA'MBATIVE. *a.* (from *lambo*, Latin, to lick.) Taken by licking (*Brown*).

LA'MBATIVE. *s.* A medicine taken by licking with the tongue (*Wiseman*).

LA'MBENT. *a.* (*lambens*, Latin.) Playing about; gliding over without harm (*Dryden*).

LAMBERT (John), major-general in the parliament army during the great rebellion. He distinguished himself at the battles of Naseby and Fife, and assisted Cromwell in his advancement to the protectorate, but opposed his assumption of the title of king. At the restoration he was tried and condemned, but received a pardon, and died an exile in the island of Guernsey.

LAMBERT (Claude Francis), a French writer, who is the author of several compilations and romances, the chief of which is

a Literary History of Louis XIV. for which he obtained a pension. He died in 1764.

Lambert (George), an English painter of landscape. He was instructed by Hassel, and imitated Wooton, but afterwards adopted the manner of Gaspar, but with more richness of composition. He painted scenes for the play-house, and some pictures for the East-India house. He died in 1765.

Lambert (John Henry), an eminent mathematician, was a native of Mulhauzen in Alsace, where he was born, April 28, 1728. His education was very confined, but he exhibited early indications of genius. At a very early period he invented an arithmetical machine, a mercurial pendulum that vibrated for 27 minutes, arithmetical scales, and a machine for drawing in perspective. From 1748 to 1756, he was engaged as tutor to the grandsons of M. le Comte de Salis, at Coire. In 1757, the tutor and his pupils went to Utrecht, and passed the year in Holland: at this time he published his Treatise on the Passage of Light, at the Hague. Afterwards they travelled to Paris, where Lambert was introduced to Dalembert. In 1759, he published his Perspective at Zurich. From 1753 to 1760, he had several pieces published in the Acta Helvetica. In 1759, his Photometry was printed at Augsburg. In 1760, he collected the different pieces, still in a fugitive state, of his Novum Organum; but which was not published till 1764. In 1761, his Treatise on the Properties of the Orbits of Comets was printed at Augsburg. He was admitted a pensioner of the Berlin Academy in 1765, from which time, to his death, in September 1777, he furnished many memoirs for the several volumes of that academy.

The scientific knowledge of Lambert was very considerable: and he had great independence of mind, and a very warm and vivid imagination. It may be added, to his honour, that he was not only religious, but highly devotional; and that he was as much celebrated as a Christian as a philosopher.

LAMBERTIA. In botany, a genus of the class tetrandria; order monogynia. Calyx common, many leaved, imbricate, seven-flowered; petals four, bearing the stamens; stigma tubulate, grooved; capsule one-celled, two-seeded; seeds margined. One species: a branchy shrub of New Holland.

LA'MBKIN. *s.* (from *lamb.*) A little lamb (*Spenser*).

LA'MB'S-WOOL. *s.* (*lamb* and *wool.*) Ale mixed with the pulp of roasted apples.

LAMDOI'DAL Suture. In anatomy (*Sutura Lambdoidalis*, from Λ, and εἶδος, resemblance, because it is shaped like the letter Λ). Occipital suture. The suture that unites the occipital bone to the two parietal bones.

LAME. *a.* (laam, lama, Saxon.) 1. Crippled; disabled in the limbs (*Daniel*). 2. Hobbling; not smooth: alluding to the feet of a verse (*Dryden*). 3. Imperfect; unsatisfactory (*Bacon*).

To Lame. *v. a.* (from the adjective.) To cripple (*Shakspeare*).

LAMECH, of the race of Cain, was the son of Methusael, and father of Jabal, Jubal, Tubal-cain, and Naamats. See Genesis, ch. iv. ver. 18, 19, 20.

Lamech, the son of Methuselah, and father of Noah. Genesis, ch. v. ver. 25, 31.

LAMELLA. In natural history, a thin plate. In botany, applied to the plates of which the under part in some Funguses is composed: hence these are called *lamellated* or *lamellous* Funguses. Gills is the common English name for *lamellæ*.

LA'MELLATED. *a.* (*lamella*, Latin.) Covered with films or plates (*Derham*).

LA'MELY. *ad.* (from *lame.*) 1. Like a cripple; without natural force or activity (*Wiseman*). 2. Imperfectly; without a full or complete exhibition of all the parts (*Dryden*).

LA'MELESS. *s.* (from *lame.*) 1. The state of a cripple; loss or inability of limbs (*Dryden*). 2. Imperfection; weakness (*Dry.*)

LA'MENESS, in horses or other quadrupeds, any disease in the limbs by which a free progression is impeded.

"The steps of a horse in a sound state," observes Mr. Clark, are equal and uniform; a certain harmony subsisting in the motion of the whole body and limbs, any deviation from this harmony, or defect in moving the legs, constitutes lameness.

"Various are the causes which may occasion this, and frequently a combination of causes may take place at one and the same time in different parts of the same limb; for instance, a prick with a nail in the foot, and a strain in the tendons of the legs, the ligaments of the joints, or in the shoulders, happen frequently together; for, as the pain arising from the nail in the quick causes the horse to trip and stumble in riding, an exertion to save the pained foot may, and indeed frequently does, occasion the straining of the ligaments of the joints or the tendons, &c. of the legs; and thus a complication of the causes of lameness is produced. The same effects are likewise produced from bony excrescences on the legs, which occasion pain; or even an exertion of the horse to save the pained limb, in such case, may occasion his straining some of the muscles in the shoulders," &c.

Here Mr. Clark remarks, very properly, on the very erroneous notions entertained of what is called a shoulder-slip. This phrase is supposed to imply a separation of the shoulder-blade from the ribs, a circumstance which never can happen to this bone, from the nature of its junction with the ribs; for the scapula is not fixed to the body by any joint, but by apposition, that is, laid along the outside of the ribs, and there fastened by the muscles, &c. which lie both on the inside and outside of the shoulder-blade;

hence, though the muscles and tendons of the shoulder may be overstretched or strained, the bone never can slip out of its place without a force sufficient to destroy the texture of the parts which connect the latter with the ribs. It is true, that the ligament which surrounds the articulation where the humerus joins with the scapula, at the point of the shoulder, is exposed to considerable injury from strains, &c. as is the case with other joints; but Mr. Clark asserts (what will be easily credited by every scientific veterinarian), that he never knew nor heard of a single instance of its being dislocated in a horse, although it must be allowed that the thing is possible. Hence, therefore, he thinks the term "shoulder slip" improper, only tending to mislead young and inexperienced men, and that it should be expunged from veterinary language.

"Lameness," continues the same writer, "frequently proceeds from tumours growing upon the bones of the legs, or on those immediately connected with them: these are commonly termed, in horses, splints, spavins, osslets, ringbones, &c. (see the plates), and are distinguished or named from the particular part on which they grow. But, as these bony excrescences (or exostoses, as they are called in the human body) are not limited to particular parts of the legs, but are libale to grow on every other bone, they sometimes are concealed in such situations that it is impossible they can be discovered, although their effects in causing lameness, when connected with the parts that are conducive to motion, are very apparent; instances of which might be met with almost every day, if horses were more frequently dissected." A horse's shoulder-bone, which Mr. Clark preserved, evinces this fact; since it has an exostosis, about the size of a large nut, on the thinnest and most transparent part of the scapula on its inside. This having lain next to the ribs, the horse was, of course lame for several years, though the cause could not be discovered till after dissection; when it appeared, that this bony excrescence was so situated as to press upon the middle of the sub-scapulary muscle.

"Something of the same nature as these exostoses," says Mr. Clark, "likewise takes place on the small bones of the joints, especially in those of the hind-legs; the osseous matter forming a number of small tumours between the joints, and cementing two or more of these bones together, which impedes the action of the joint, and consequently occasions lameness.

"Many persons flatter themselves that they can cure these bony excrescences by blistering, &c. even after they have acquired their utmost solidity; but those who are acquainted with the anatomical structure of the parts, the solidity and broad basis of these bony tumours, together with the firm connection they have with the bone on which they grow, will at once see the insufficiency of this method. It is true, in some cases, where these tumours have a narrow base, they may be taken off with a chissel; but this operation must, in many cases, be attended with consequences much more detrimental to the horse than the excrescence would be in its fullest growth: indeed, a caries in the leg-bone may follow, and the cicatrix that remains will disfigure the horse more than the excrescence would have done in its full extent. Splints of an uncommon size we daily see on horses legs, that yet do not go lame in the least. Hence, therefore, it is obvious, that it is not the size of a splint that causes lamenesss, after it has grown to its full extent, but rather its interference with some of the soft parts that are subservient to the motion of the legs.

"It likewise frequently happens, that these excrescences grow up between the two small bones on the back-part of the fore-legs, and immediately under the tendons; the grooves or hollows that are there formed on the surface of the excrescence, whilst it is in its soft state, by the friction of the tendons, evidently show that they have been impeded in their motion. In this situation it becomes impossible to remove the excrescence, especially as it frequently happens that the leg-bone, in such cases, is considerably enlarged, a case for which there is no cure, as will be evident on inspecting the bare leg-bones that may be found almost in every field in which there are any dead horses."

Mr. Clark here adduces the authorities of Van Swieten and M. Petit, to shew the effects which bony excrescences produce on the human body on their first appearance; but these, though not inapplicable to the purpose of illustration, need not be produced in this place.

"That the same effect," he observes, "is produced by these excrescences growing on the leg-bones of horses, called splints, is very evident from their first beginning to rise on the outside of the bone: they distend or overstretch the periosteum which covers the bone; this creates pain, which is followed with lameness in horses: but, when this membrane is either divided, ruptured, or becomes benumbed by the distention it has undergone, the pain arising from it ceases, and unless the excrescence communicates with some other bone, or presses on some of the parts that are conducive to motion, as the tendons, &c. the lameness goes off, although the tumour on the bone remains in its full extent.

"Lameness likewise proceeds from rheumatic pains in different parts of the body, which frequently change from one place to another, and from cramps, spasms, sciatica, &c. all of which produce lameness; the true seat of which, in some cases, cannot be ascertained with any degree of certainty. Other causes of lameness are more easily discovered from their external appearance, or

the symptoms which attend them, as a swelling of the parts affected, attended with pain to the animal upon touching them: of this kind are sprains, either of the ligaments of the joints, or of the muscles and tendons of the legs and shoulders.

"Lameness likewise proceeds from blows, as these occasion contusion; or from wounds and punctures, from watery sores about the legs or heels, under every denomination whatever; as, in these cases, the parts are more or less swelled and inflamed, and, of course, unfit for action.

"Lameness likewise proceeds from violent and long continued exercise, which occasions too great a waste of the synovia of the joints; hence they become stiff, and, on the horse's moving, make a crackling noise. The same effect is likewise produced from a variety of other causes which are confined to the feet, as pricks from nails in shoeing, wounds in the hoofs from nails picked up in the streets, glass, sharp-pointed bones, &c. which penetrate into the quick, from injudicious shoeing (see Shoeing), and paring the hoofs to excess, or suffering them to grow too large or long at the toes, by which the feet are benumbed, a partial contraction taking place at the coronet and heels, or a contraction of the whole hoof, which is commmonly known by the name of hoof-bound. This last disease is a consequence of keeping the legs and hoofs too hot and too dry, by a great quantity of litter and perhaps hot dung at all times under them. The practice of the Arabians ought, in this respect, to be adopted, which is, washing the legs of their horses frequently through the day with cold water. Whilst this is natural to horses' hoofs, it at the same time not only keeps the legs cool, but contributes to brace and strengthen the muscular fibres, and to prevent swellings, &c. in them. How differently treated are our horses in this respect? No such precautions are ever intentionally adopted, but directly the contrary; for it may literally be said, that they are compelled at all times (when in the stable) to stand on a hot-bed, whilst, at the same time, their hoofs are basted with oil, or other things, perfectly of an opposite quality to the intention with which they are applied. It is by this means that the generality of fine horses that are much kept in stables, sooner or later, become lame.

"Lameness likewise proceeds from corns, running thrushes, from gravel insinuating itself between the shoe and the sole of the foot, especially in weak hoofs, or, by forming a lodgment there, it at last penetrates into the quick, which is called graveling.

"There is likewise another kind of lameness peculiar to the hind-quarters, and which occasions a sudden jerking of the legs upwards on moving; by some it is called string-halt, and by others click-spavin. This complaint seems to be a particular affection of the nerves of the leg, which causes this kind of involuntary motion, for which no one has yet proposed any certain method of cure.

"From all these, and a variety of other causes, lameness is produced, the true seat of which, in many cases, cannot be discovered by any external appearances;" hence, Mr. Clark says, "practitioners ought to be very cautious in speaking of the causes of lameness, before they positively have discovered the particular seat of the disease, or the circumstance which produces it. From a want of this precaution, together with a too superficial inspection of the parts, and too hasty a determination as to the seat or cause of lameness, applications have been made to the sound parts, whilst the real cause has soon afterwards shewn itself to be elsewhere, perhaps in the hoof, to the shame and confusion of the practioner. Therefore, unless the cause of a horse's lameness is perfectly evident, it will be prudent to examine, at all times, the foot of the lame limb first, with care and attention; and, if it should still appear doubtful, to inspect it on the next day, and even a third time, rather than give too hasty a determination with respect to the seat of a horses lameness. Indeed, the foot is always to be suspected; and especially after a horse has been newly shod, or had his shoes fastened, or when the shoe lies too flat, so as to press upon the sole, or when the shoe is made too narrow for the hoof, or if there be a corn in the foot. A horse may be lame from a nail, although it be not driven immediately into the quick, by its thickness pressing on the soft parts, or from its being bent inwards upon the quick; or, when driven too near, it will raise a small portion of the hoof, its own breadth, and force it upon the quick; and this last is the reason why horses remain a longer time lame after such accidents, than when a nail has been driven immediately into the quick. A wound by a nail in the fleshy part of the foot, if discovered soon and properly treated, suppurates, and soon heals up; but a thin splinter, when raised from the hoof by a nail, and forced on the quick, has more lasting effects, and the horse will be longer lame."

From what has been said, Mr. Clark insists, that no certain rules can be laid down for discovering the true seat of lameness in a horse from the motion of his body, although much has been pretended on the subject. "For," says he, "when any of the parts which are necessary to the motion of the body are injured, the adjacent parts will be affected more or less; and thus, by a kind of sympathy, the whole limb will be affected: thus, a prick with a nail in the foot will cause an inflammation of the whole leg; the shooting pains, in these cases, may affect the muscles of the shoulders, so as to obstruct their motion, and, upon touching or pinching those parts, the horse will flinch, and shew a sense of pain in them, and a stiffness in moving forward or sidewise, that will be very apt to mislead the unwary, and

make them conclude that the cause of lameness is centered entirely in the shoulder, when, in fact, these are only symptoms which proceed from the shooting pains occasioned by the nail in the foot.

"The caution above mentioned will appear still more necessary, when it is considered, that bony excrescences excite the most acute pains whilst they are growing, by their effect in extending the membrane which covers the bone, and which is always attended, more or less, with some degree of inflammation on the part, although, in some cases, the situation of these tumours cannot be perceived. Whilst growing, they may be compared to the pain of teething in children, which continues till the periosteum which covers the jaw-bone is penetrated by the new tooth."

In investigating other possible causes of lameness in the horse, the same judicious writer alludes to what he formerly hinted on the subject of spasms in the muscles, cramps, &c. the real seat of which, he says, cannot easily be ascertained in horses from any external appearances that present themselves. Yet the experience of such complaints in our own persons, he thinks, sufficient to make us sensible how painful they may likewise be supposed to horses, and how likely to occasion lameness.

Another cause of lameness, which Mr. Clark notices in conclusion, is the injury done to the backs of horses by ill-made saddles, or those that are not properly fitted. "This," says he, "is a consideration of importance both to the ease of the horse and to the rider's safety. It frequently happens, however, that both suffer from inattention to this; for, if the saddle-tree be too wide, and the saddle without a crupper, it moves too far forward upon the shoulder-blades, by which means the weight of the rider, together with the points of the saddle-tree, confining the motion of the shoulder-bones, impedes their action, which causes the horse to stumble, and frequently to come down, whilst, at the same time, the cartilaginous ends of the shoulder-bones, muscles, &c. are bruised. Hence large swellings are produced on the shoulders or withers, which terminate in fistulus ulcers, and which, from the situation of the parts, are very difficult to cure. On the other hand, too narrow saddle-trees bruise the skin, and occasion those hard lumps called sitfasts or warbles, and render the horse's back tender for a long time."—

"A saddle that is well fitted should press equally on every part of the back, the middle or ridge of the spine excepted, without touching, pressing, or even coming near the shoulder-blades, which ought by no means to be interrupted in their motion; the saddle pannel, opposite to the hollows that are on each side of the spine, should be bolstered and well fitted up on each side, which will prevent it from moving too far forward on the shoulder-blades, even although no crupper is used."

As the best general means of preventing lameness in the feet, we may recommend the use of Mr. Coleman's artificial frog (see FROG). This, together with shoes properly adapted to the state of the hoof, and an attention to Mr. Clark's injunctions to keep the feet cool, and in that state of moisture which is almost natural, may undoubtedly prevent many troublesome diseases, the horse will be fine and clean limbed, and free from any disposition to grease or swelling of the heels.

The specific diseases which occasion lameness in horses are treated of under their several heads. See BLOOD-SPAVIN: BONE-SPAVIN: SPLINTS: WIND-GALLS: WENS; QUITTERS: FALSE-QUARTERS.

To LAME'NT. *v. n.* (*lamentor*, Latin.) To mourn; to wail; to grieve; to express sorrow (*Dryden*).

To LAME'NT. *v. a.* To bewail; to mourn; to bemoan; to sorrow for (*Dryden*).

LAME'NT. *s.* (*lamentum*, Latin.) 1. Sorrow audibly expressed; lamentation; grief uttered in complaints or cries (*Dryden*). 2. Expression of sorrow (*Shakspeare*).

LA'MENTABLE. *a.* (*lamentabilis*, Latin.) 1. To be lamented; causing sorrow (*Shaks.*) 2. Mournful; sorrowful; expressing sorrow (*Sidney*). 3. Miserable, in a ludicrous or low sense; pitiful; despicable (*Stillingfleet*).

LA'MENTABLY. *ad.* (from *lamentable.*) 1. With expressions or tokens of sorrow; mornfully (*Sidney*). 2. So as to cause sorrow (*Shakspeare*). 3. Pitifully; despicably.

LAMENTA'TION. *s.* (*lamentatio*, Latin.) Expression of sorrow; audible grief (*Shaks.*)

LAMENTA'TIONS, a canonical book of the Old Testament, written by the prophet Jeremiah, according to archbishop Usher and some other learned men, who follow the opinion of Josephus and St. Jerom, on occasion of Josiah's death. But this opinion does not seem to agree with the subject of the book, the Lamentation composed by Jeremiah on that occasion being probably lost. The fifty-second chapter of the book of Jeremiah was probably added by Ezra, as a preface or introduction to the Lamentations: the two first chapters are employed in describing the calamities of the siege of Jerusalem: in the third the author deplores the persecutions he himself had suffered: the fourth treats of the desolation of the city and temple, and the misfortune of Zedekiah: the fifth chapter is a prayer for the Jews in their dispersion and captivity: and at the close of all he speaks of the cruelty of the Edomites, who had insulted Jerusalem in her misery. All the chapters of this book, except the last, are in metre, and digested in the order of the alphabet; with this difference, that in the first, second, and fourth chapters, the first letter of every verse fol

lows the order of the alphabet; but in the third the same initial letter is continued for three verses together. This order was probably adopted, that the book might be more easily learnt and retained. The subject of this book is of the most moving kind; and the style throughout lively, pathetic, and affecting. In this kind of writing the prophet Jeremiah was a great master, conformably to the character which Grotius gives of him: *Mirus in affectibus concitandis.*

LAMENTA'TIONS. The funeral music of the ancient Jews was called by this name. At the death of any one it was not only usual to employ tibicines, or flute-players, to perform over the body of the deceased, but to hire at least one vocal female mourner, or lamentatrix. From the rabbin Maimonides we learn, that the husband was obliged to provide mourners to weep over the corpse of his deceased wife, and at her funeral; or at least that this was the established custom of the country. The poorest persons among the Israelites, he tells us, engaged two flutes and one female mourner; and if the husband were rich, the expence and pomp of the ceremony were proportioned to his wealth and dignity.

LAMENTATRICES. The name given by the ancient Hebrews to certain female vocal performers who were hired to chant over the dead, and to sing dirges at funerals; on which occasions they were accompanied with flutes. See LAMENTATIONS.

LA'MENTS. The name given by the Scotch to some of their old serious and melancholy airs: as Earl Douglas's *Lament*, Sir Norman Mac Leod's *Lament*, St. Kilda Girl's *Lament*, &c.

LAME'NTER. *s.* (from *lament.*) He who mourns or laments (*Spectator*).

LA'MIA. In entomology, a Fabrician-tribe of the coleopterous genus Cerambyx, which see.

LAMIÆ, a sort of demons who had their existence in the imaginations of the heathens, and were supposed to devour children. Their form was human, resembling beautiful women. Horace makes mention of them in his Art of Poetry. The name, according to some, is derived from lanio "to tear;" or, according to others, is a corruption of a Hebrew word signifying to devour. They are also called Larvæ or Lemures.

LA'MINA. In botany the border. Corollæ polypetalæ pars superior patula. The upper, broad or spreading part of the petal, in a polyptalous corol. Called limbus, in a monopetalous corol.

LA'MINA. *s.* (Latin.) Thin plate; one coat laid over another (*Sharp*).

LA'MINATED. *a.* (from *lamina.*) Plated: used of such bodies whose contexture discovers such a disposition as that of plates lying over one another (*Sharp*).

LA'MIUM. Archangel. In botany a genus of the class didynamia, order gymnospermia. Calyx five-toothed, the teeth setaceous, and spreading; upper lip of the corol vaulted, lower two-lobed; the throat inflated and toothed on each side at the margin. Thirteen species—mostly indigenous to the south of Europe—three common to our own fields and water. These three are as follow.

1. L. Album. White archangel, with cordate, pointed, serrate, petioled leaves; twenty-flowered whorls, formerly celebrated as an astringent, but long disused and forgotten.

2. L. Purpureum. Red archangel; with leaves cordate, obtuse, equally and obtusely toothed, and petioled; the young leaves boiled and eaten like spinach.

3. L. Amplexicaule. Floral leaves sessile, clasping the stem, obtuse.

To LAMM. *v. a.* To beat soundly with a cudgel.

LAMMAS-DAY, the first of August; so called, as some will have it, because lambs then grow out of season, as being too big. Others derive it from a Saxon word, signifying "loaf-mass," because on that day our forefathers made an offering of bread made with new wheat. On this day the tenants who formerly held lands of the cathedral church in York, were bound by their tenure to bring a lamb alive into the church at high-mass.

LAMP, a vessel containing oil, with a lighted wick. Lamps were in general use among the Jews, Greeks, and Romans. The candlestick with seven branches, placed in the sanctuary by Moses, and those which Solomon afterwards prepared for the temple, were crystal lamps filled with oil, and fixed upon the branches. The lamps or candlesticks made use of by the Jews in their own houses, were generally put into a very high stand on the ground. The lamps supposed to be used by the foolish virgins, &c. in the Gospel, were of a different kind.—According to critics and antiquaries, they were a sort of torches, made of iron or potter's earth, wrapped about with old linen, and moistened from time to time with oil. Matth. xxv. 1. 2. The lamps of Gideon's soldiers were of the same kind. The use of wax was not unknown to the Romans, but they generally burnt lamps; hence the proverb *Tempus et oleum perdidi*, "I have lost my labour." Lamps were sometimes burn in honour of the dead, both by Greeks a Romans.

Dr. St. Clair, in the Philos. Trans. No. 2 gives the description of an improvement the common lamp. He proposes tha should be made two or three inches d with a pipe coming from the bottom as high as the top of the vessel. Let filled so high with water that it may the whole of the pipe at the bottom, t the oil may not get in at the pipe, and so lost. Then let the oil be poured in so as to fill the vessel almost brim-full; and to the

vessel must be adapted, a cover having as many holes as there are to be wicks. When the vessel is filled and the wicks lighted, if water falls in by drops at the pipe, it will always keep the oil at the same height or very near it; the weight of the water being to that of the oil as 20 $\frac{8}{11}$ to 19, which in two or three inches makes no great difference. If the water runs faster than the oil wastes, it will only run over at the top of the pipe, and what does not run over will come under the oil, and keep it at the same height.

Lamps, *Perpetual*. The testimonies of Pliny, St. Austin, and others, have led many to believe that the ancients had the invention of perpetual lamps; and some moderns have attempted to find out the secret, but hitherto in vain. Indeed it seems no easy matter to find out either a perpetual wick or a perpetual oil. The curious may read Dr. Plot's conjectures on the subject in the Phil. Trans. No. 166; or in Lowthorp's abridgment, vol. iii. p. 636. But few, we believe, will give themselves the trouble of searching for the secret, when they consider that the credulity of Pliny and of St. Austin were such, that their testimony does not seem a sufficient inducement to us to believe that a lamp was ever formed to burn 1500 or 1000 years; much less is it credible that the ancients had the secret of making one burn for ever.

Lamp, *Argand's*. This is a very ingenious contrivance, and the greatest improvement in lamps that has yet been made. It is the invention of a citizen of Geneva; and the principle on which the superiority of the lamp depends is the admission of a larger quantity of air to the flame than can be done in the common way. This is accomplished by making the wick of a circular form, by which means a current of air rushes through the cylinder on which it is placed with great force; and, along with that which has access to the outside, excites the flame to such a degree, that the smoke is entirely consumed. Thus both the light and heat are prodigiously increased, at the same time that there is very considerable saving in the expense of oil, the combustion being exceedingly augmented by the quantity of air admitted to the flame; and that what in common lamps is dissipated in smoke is here converted into a brilliant flame. This lamp is now very much in use; and is applied not only to the ordinary purposes of illumination, but also to that of a lamp furnace for chemical operations, in which it is fonnd to exceed every other contrivance yet invented. It consists of two parts; viz. a reservoir for the oil, and the lamp itself. The reservoir is usually in the form of a vase, and has the lamp proceeding from its side. The latter consists of an upright metallic tube, about one inch and six-tenths in diameter, three inches in length and open at both ends. Within this is another tube, about an inch in diameter, and nearly of an equal length; the space betwixt the two being left clear for the passage of the air. The internal tube is closed at the bottom, and contains another similar tube, about half an inch in diameter, which is soldered to the bottom of the second. It is perforated throughout, so as to admit a current of air to pass through it, and the oil is contained in the space betwixt the tube and that which surrounds it. A particular kind of cotton cloth is used for the wick, the longitudinal threads of which are much thicker than the others, and which nearly fills the space into which the oil flows; and the mechanism of the lamp is such, that the wick may be raised or depressed at pleasure. When the lamp is lighted, the flame is in the form of a hollow cylinder; and by reason of the strong influx of air through the heated metallic tube becomes extremely bright, the smoke being entirely consumed for the reasons already mentioned. The heat and light are still farther increased, by putting over the whole a glass cylinder, nearly of the size of the exterior tube. By diminishing the central aperture the heat and light are proportionably diminished, and the lamp begins to smoke The access of air both to the external and internal surfaces of the flame is indeed so very necessary, that a sensible difference is perceived when the hand is held even at the distance of an inch below the lower aperture of the cylinder; and there is also a certain length of wick at which the effect of the lamp is strongest. If the wick be very short, the flame, though white and brilliant, emits a disagreeable and pale kind of light; and if it be very long, the upper part becomes brown, and smoke is emitted.

We shall now give from Gregory's Cyclopedia, an improvement of this invention. See Plate 93.

The upper compartment of the plate represents an improved construction of Argand's lamp. A, fig. 1. is the reservoir for the oil, which unscrews at B; in order to fill it the oil is poured in at a hole *a*, fig. 4, in the lower end of the reservoir, which is covered, when the lamp is not burning, by a sliding collar, *b*, drawn up by a handle, *d*, which comes through a hole in the screw, *e*, by which the reservoir is screwed in the short tube, E, fig. 1: there being no vent-holes in the upper part of the reservoir, A, to admit the air as the oil runs out, a bubble of air must enter the hole, *a*, fig. 4, to supply the place of every drop of oil that comes out, when the reservoir, A, is screwed to the tube, E; the collar, *b*, being down, the oil runs out (the air being admitted from without through a small hole, *f*), till E is filled above the level of the hole, *a*, which prevents more air getting in; it remains in this state till by the burning of the lamp the oil is drawn down beneath the hole, *a*, when it is filled again as before; by this means the lamp is always well supplied, but never overstocked with oil. From the bottom of the tube, E, fig. 1, the oil is conveyed by a pipe, D, to

the lamp, the constitution of which is best explained in fig. 2; EF is the external tube of brass, which is supplied with oil by the pipe D; in the centre of this another tube, GG, is soldered, which is open at both ends: between these tubes is a cylinder of slightly wove cotton, *gg*, called the wick; this is fastened to a small cylinder of brass, *hh* (shewn separately in fig. 3), which can be moved down and up as the wick burns. The wick is lowered or raised by turning round the cylinder, HH (shewn separately in fig. 5), by means of its rim, II, fastened to the cylinder, HH, by three small rods, *ii*; the cylinder, HH, fig. 5, has a spiral groove, *kk*, cut obliquely round it: the cylinder, *hh*, figs. 2 and 3, which goes within the cylinder, HH, has a small stub, *l*, projecting from it, which works into the groove, *kk*, fig. 5; the leaf, *l*, is long enough to project a small distance through the groove, *kk*, and when in its place takes against a small bead, *n*, fig. 2, fixed withinside the cylinder, FF, so as to prevent its turniug, when HH is turned by its rim, II. By the above arrangement it is evident, that when the cylinder, HH, fig. 5, is turned round, *h* is prevented from turning, the sides of the groove, *k*, will act as an inclined plane against the stub, *l*, and raise the cylinder *h* down or up, and the cotton wick, *gg*, with it. The rim, II, figs. 1, 2, and 5, has an ornamented border, L, round it, which serves to secure the glass chimney, *o*, from being overthrown. To prevent the cylinder, HH, from being lifted out by accident, it has a rim, *o*, figs. 2 and 5, at the lower end, cut through in one place to allow it to pass down by the bead, *n*; when it is below the end of the bead it cannot be raised, unless the notch in the rim, *o*, corresponds with the bead. When the wick, *gg*, figs. 1 and 5, is lighted, it rarefies the air in the glass chimney, O, and causes a draught through the tube GG, to supply the inside of the wick, and also under the edge of the glass chimney to supply the outside; as the wick burns down it can be raised from time to time by turning the rim, I, as before described. The tube, FE, is always nearly full of oil, brought by the pipe, D. When it is required to put in a new wick, the glass chimney O, is lifted off; the tube *hh*, is screwed up to the top; by turning the rim, II, the tube fig. 3, is then taken out, the old wick pulled off, and a new one is put round the small part, *m*, of the tube, which is then put in again, and screwed down to the proper depth for lighting the wick.

Lamp, *Rolling*. A machine AB, pl. 93. fig. 6, with two moveable circles DE, FG, within it; whose common centre of motion and gravity is at K, where their axes of motion cross one another. If the lamp KC, made pretty heavy and moveable about its axis HI, and whose centre of gravity is at C, be fitted within the inner circle, the common centre of gravity of the whole machine will fall beteen K and C; and by reason of the pivots A, B, D, E, H, I, will be always at liberty to descend: hence, though the whole machine be rolled along the ground, or moved in any manner, the flame will always be uppermost, and the oil cannot spill. It is in this manner mariners hang the compass at sea; and thus should all the moon-lanterns be made, that are carried before coaches, chaises, and the like.

It is found that a lamp will burn without consuming any considerable portion of its wick, as long as it is amply supplied with oil: hence it becomes desirable that it should be level with the surface of the reservoir; and this may be effected sufficiently well by placing the wick at the edge of a very large vessel, or at the end of a tube projecting from such a vessel, or from a vessel closed above, and opening only by an orifice below, which lets in the air as the oil escapes through it. But all these methods have their attendant inconveniences. Mr. Keir's lamp contains a divided cavity, one part of which is filled with oil, and the other with a saccharine or saline fluid of greater density, so that when the oil contained in the upper part of the tube is exhausted, its place is partly supplied by a fresh portion, which is forced up in consequence of the descent of the denser fluid in a much larger vessel. Still, however, the surface must be lowered by degrees: but, by combining the invention with Dr. Hooke's cemicylindrical counterpoise, a little modified, the height of this fluid may be so regulated, that the surface of the oil may remain almost invariable, until the reservoir is quite exhausted. For this purpose the centre of gravity of the counterpoise must be a little higher than the line which bisects it; and its specific gravity must be about three-fourths as great as that of the liquid; and in this manner it may be made to raise the surface of the heavier liquid, in proportion as a greater quantity of it escapes, to supply the place of the oil; and to keep it always at a sufficient height above the surface which separates it from the oil, so that the wick may be amply and almost uniformly supplied. A more particular description of this ingenious contrivance, is given in vol. 1. of Dr. T. Young's Philosophy, and illustrated with a diagram.

The saving of oil which arises from making use of an Argand's lamp, above described, instead of a common lamp, in the production of light, is evident; and it appears, from Count Rumford's experiments, that that saving cannot amount to less than fifteen per cent. How far the advantage of this saving may, under certain circumstances, be counterbalanced by inconveniences that may attend the making use of this improved lamp, our author does not pretend to determine.

The Count made a considerable number of experiments to determine the relative quantities of light emitted by an Argand's

lamp and a common wax candle; and the general result of them is, that a common Argand's lamp, burning with its usual brightness, gives about as much light as nine good wax candles; but the sizes and qualities of candles are so various, and the light produced by the same candle so fluctuating, that it is very difficult to ascertain, with any kind of precision, what a common wax candle is, or how much light it ought to give. He once found that his Argand's lamp, when it was burning with its greatest brilliancy, gave twelve times as much light as a good wax candle three-fourths of an inch in diameter, but never more.

From the results of all the count's experiments, it appears that the relative expense of the undermentioned inflammable substances, in the production of light, is as follows:

		Equal Parts in Weight.
Bees' wax.	A good wax candle, kept well snuffed, and burning with a clear, bright flame - -	100
Tallow.	A good tallow candle, kept well snuffed, and burning with a bright flame - - -	101
	The same tallow candle, burning very dim for want of snuffing -	229
Olive oil.	Burnt in an Argand's lamp - - -	110
	The same burnt in a common lamp, with a clear, bright flame, without smoke -	129
Rape oil.	Burnt in the same manner - - -	125
Linseed oil.	Likewise burnt in the same manner - -	120

With the foregoing table, and the prices current of the therein mentioned articles, the relative prices of light produced by those different materials may very readily be computed.

In the year 1795, Mr. J. H. Hassenfratz was employed by the French government to make a series of experiments to determine the most economical method of procuring light from the different combustible substances usually employed for that purpose. The materials of his experiments were, wax, spermaceti, and tallow candles, fish oil, oil of cole-seed, and of poppy seeds. In using these oils, both the Argand and common lamps were employed. The wicks of the latter were round, containing thirty-six cotton threads. The tallow and spermaceti candles were mould, six to the pound. The wax candles five to the pound. Mr. Hassenfratz used the same method with Count Rumford for determining the comparative intensity of the lights.

Count Rumford, as we have seen, used the Argand lamp as a standard for comparison; but as the intensity of its light varies according to the height of the wick, Mr. Hassenfratz preferred a wax candle, making use of it soon after it was lighted. When two luminous bodies, of different intensities, are put in comparison with each other, the shadows are of two colours. That from the weakest light is blue, and from the strongest, red. When the lights of two different combustible bodies are compared, they are either red or blue in a compound ratio of the colour and intensity. Thus in comparing the shadows from different luminous bodies, they will be red or blue respectively, in the following order:

Light of the sun.
—— of the moon.
—— of Argand lamps.
—— of tallow candles.
—— of wax ditto.
—— of spermaceti ditto.
—— of common lamps.

That is to say, when a body is illuminated by the sun and by any other luminous substance, the shadow of the former is red, and of the latter blue. In like manner, the shadow from an Argand lamp is red, when placed by that of a tallow candle, which is blue.

The following table will shew, according to Mr. Hassenfratz, the proportional distance that different luminous bodies should be placed at, to produce an equally intense shadow from the same object. The second column gives the proportional intensity of each light, which is known to be in proportion to the squares of the distances of luminous bodies giving the same depth of shadow. The third column shews the quantity of combustible matter consumed in the hour by each mode of giving light, which Mr. Hassenfratz calculates from the average of many repeated experiments.

		Distance.	Intensity.	Quantity consumed per hour.	Quantity required for equal intensities.
Argand Lamps, with	Oil of poppy seed	10	10·000	23	23
	— of fishes -	10	10·000	23·77	23·77
	— of cole-seed	9·246	8·549	14·18	16·59
Common Lamps, with	Oil of cole-seed	6·774	4·588	8·81	16·2
	— of fishes -	6·524	4·559	9·14	20·06
	— of poppy seed	5·917	3·501	7·05	20·14
Spermaceti candle	- - -	5·917	3·501	9·23	26·37
Old tallow candle	- - -	5·473	2·995	7·54	25·17
New ditto	- - - - - -	5·473	2·995	8·23	27·48
Wax candle -	- - - -	4·275	1·827	9·54	53

The relative quantity of combustible matter required to produce equal lights at equal distances, may be obtained by a simple rule of proportion from the above data. Thus, if a given intensity of light, expressed by 3·501, has been produced by a consumption of 9·23 of spermaceti in the hour, the same luminous body will produce a light of 10·000, by consuming in the same time a quantity

of spermaceti $= \frac{10\cdot000 \times 9\cdot23}{3\cdot501} = 26\cdot37.$—

Therefore we may add to the table a fourth column, expressing the quantity of combustible which each body must consume to produce a light of 10·000.

From what has been laid down, it will also appear that the number of lights required to produce a given light, will be as follows: To produce a light equal to 100 Argand lamps, burning poppy seed oil, it will require

100 Argand lamps with fish oil
117 Ditto do. with cole-seed oil
218 Common lamps with cole-seed oil
219 Ditto do. with fish oil
285 Ditto do. with poppy seed oil
285 Spermaceti candles
333 Tallow ditto
546 Wax ditto.

Mr. Hassenfratz next takes notice of the comparative price of these articles; by which he finds, that in Paris the most expensive light is that produced from wax candles; and the most economical, that from oil of cole-seed, burned in Argand lamps.

See farther the article CANDLE.

LAMP-*Black*, a pigment so denominated from its being occasionally obtained from the black soot of lamps. This, however, is not the mode of obtaining it for common use, though it may be procured from the combustion of any oily or resinous substances.

Lamp-black, as sold in the shops, is of two kinds: the one kind, the light soot from burning wood of the pine, or of other resinous woods; and the other a heavy black prepared from bones, by burning them in close vessels, and not unfrequently denominated *ivory-black.*

The part of the pine usually employed in the former sort, is most frequently the impure resin or turpentine; whence lamp-black, properly so called, is prepared in large quantities by all the turpentine manufacturers, and from the impure resin that remains after the distillation of the oil, as well as from other refuse matters of the same kind. These are burnt in iron pots, or in a furnace appropriated for the purpose, and the dense smoke arising from the combustion is introduced into chambers hung with sacking, upon the surface of which the soot or lamp-black is deposited, and whence it is swept off from time to time and sold without any farther preparation. Common lamp-black is not indeed pure charcoal, being mixed with some empyreumatic acid and a portion of resin, in a state of imperfect decomposition; but after it has been heated to redness in a close vessel, all these impurities are driven off, and there remains behind a carbon, or charcoal, in a state of nearly perfect purity, as it will burn away with scarcely any perceptible residue.

The carbon of a similar kind, denominated *ivory-black*, is obtained from bones during the process of distilling them for the purpose of obtaining ammonia. If the distillation be stopped when the oil first arises, which, from the first discoverer is called *Dippel's* oil, it comes out very black, the bones are found drenched with an oil of the same kind very dark and fetid. If the whole be then urged to redness in a close earthen or iron vessel, till every thing volatile has passed over, the earth of the bones remains so thoroughly impregnated with the fine charcoal of the oil as to be uniformly black, glossy, and brittle. When ground to a fine powder, mixed with size and made up into cakes, the substances sold in the shops by the name of ivory-black is completed; and this, from its greasy nature, readily mixes with oil, and is the material for most of the ordinary black paints and varnishes.

A fine black of the same kind is obtainable by charring ivory shavings in close vessels: and as this, though the more expensive, is the way in which this material was first obtained, the cause of the name is obvious.

LAMPADA'RIUS. (Greek.) The name given to that of the two principal singers, in the patriarchal church of Constantinople, who holds the first place on the left side of the choir. The appellation of lampadarius is supposed to be derived from the musical writer and composer of that name, who flourished about the year 1300, and is conjectured to have been the first who filled the office.

LA'MPAS, (called also *Lampers*, and *Lampards*,) a spongy elastic enlargement of the roof of a young horse's mouth, just behind the nippers of his upper jaw, by which the bars of the mouth often project below the surface of the upper teeth. The actual cautery has been often recommended in this complaint, but cruelly and absurdly. If the protuberance be so considerable as to produce pain in mastication, it will generally be found sufficient to pass the point or edge of a sharp penknife or lancet, transversely, and longitudinally, over the puffy and prominent part, so as to let it bleed for a few minutes; it should afterwards be washed with a solution of alum in water, and no farther inconvenience need be feared.

LA'MPERN, in zoology. See PETROMYZON.

LA'MPING. *a.* (λαμπέλάων.) Shining; sparkling: not used (*Spenser*).

LAMPO'ON. *s.* A personal satire; abuse; censure written not to reform but to vex (*Dryden*).

To LAMPO'ON. *v. a.* (from the noun.) To abuse with personal satire.

LAMPO'ONER. *s.* (from *lampoon.*) A scribbler of personal satire (*Tatler*).

LA'MPREY. See PETROMYZON.

LAMPSA'NA. See LAPSANA.

LAMPY'RIS. Fire-fly. In zoology, a genus of the class insecta, order coleoptera. Antennas filiform; feelers four; shells flexible; thorax flat, semiorbicular, surrounding and concealing the head; segments of the abdomen terminating in folded papillæ; female (usually) apterous. Fifty-two species—scattered over the four quarters of the globe; of which two only are found in our own country. They may be thus subdivided:

A. Feelers subclavate,

α With horny, entire lip: the Lampyris of Fabricius.

β. With membranaceous, emarginate lip; forming the Fabrician tribe Omalyssus.

B. Four-feelers hatchet-shaped. The tribe Cossyphus of Fabricius: constituting, however, but a single species L. depressa. An inhabitant of India.

C. Feelers subfiliform. The Pyrochroa of Fabricius.

D. First joint of the feelers thicker and truncate: the tribe Lycus of Fabricius.

The following are the chief species:

1. L. Noctiluca. Glow-worm. Oblong, brown, shield cinereous. Inhabits woods and meadows of our own country, and other parts of Europe. The female is larger than the male, and emits a beautiful light, (supposed to be phosphorescent but not really so) for the purpose of attracting the male; this issues from the four last rings of the abdomen. The male has a power of emitting a feeble light, but very disproportioned to that of the female.

Two or three of these insects enclosed in a glass vase, will give a light sufficient to enable a person to read in the darkest night.

This singular phenomenon is observed most frequently in the month of June, when the insect is in motion. The female can withdraw or display this light at pleasure, by contracting or unfolding her body. When crushed with the hand, this luminous substance of the glow-worm adheres to it, and continues to shine till it is dried up.

2. L. Japonica. Yellow; last segment but two of the abdomen black: antennas, eyes, and wings black. Inhabits Japan; flies about in the evenings during the months of May and June, and scatters a luminous vapour from two vesicles at the end of the tail.

3. L. Depressa. Brown; margin of the shield and shells dilated, flat. Inhabits India.

4. L. Coccinea. Head, thorax and shells sanguineous; body black: antennas pectinate. Inhabits England and other parts of Europe: very rarely in any degree phosphorescent.

5. L. Pennsylvanica. Oblong; shells grey—testaceous; thorax black within the margin, with two rafous spots. Inhabits America; and emits a phosphoric light in the evening like the glow-worm. The eggs of all these are minute, of a yellowish hue, and deposited on grass-leaves.

LA'NA. Wool. In botany, *Pili curvi densi.* Delin. Pl.—*servans plantas ab æstu nimio.* Philos. Bot. Crooked or curling, close, thick hairs: the principal use of which is to defend plants against too great a degree of heat. As in Salvia canariensis, and Æthiopis. Sideritis canariensis. Marrubium. Verbascum. Stachys. Carduus eriocephalus. Onopordum. See WOOL.

LANA'RIA. In botany, a genus of the class hexandria, order monogynia. Corol superior, woolly, longer than the filaments, with a six-parted, spreading border; calyxless; pericarp three-celled. One species; a woolly herb of the Cape.

LANATE. Woolly. In botany applied to the stem; as in *Stachys germanica*, &c.—*Lanatum folium.* A woolly leaf. *Quasi tela araneæ indutum*—to which is added in Delin. Pl. *pilis sponte curvatis.* With a covering resembling a spider's web, composed of hairs curling spontaneously: as in Salvia and Sideritis.

LANCASHIRE, a county of England, bounded on the north by Cumberland, West-

moreland, and Yorkshire; on the east by Yorkshire, on the south by Cheshire, and on the west by the Irish Sea; seventy-four miles long, and from fifteen to forty-four wide. The form is irregular, not very unlike to England, Wales, and part of Scotland united, the indentations on the borders being similar. A ridge of mountains separates it from Yorkshire, and continuing its course through some other counties, has been called the Back-bone of England: this mountain screens the county from the easterly winds and the attendant evils, and is thought to cause a greater quantity of rain than in the more interior parts of the kingdom; but does not seem to make the climate the less wholesome. In the north-east part of this division the hills are very lofty: the highest is called Pendle Hill, on the side of which is a very extensive factory for printing cottons, &c. Lancashire has some local advantages, which have been the cause of rendering the country so famous for its manufactures. These, in a great measure, depend upon the two most material articles of coal and water; the former of which lies in immense beds towards the southern and middle part, and the many rivers, &c. which in so many places intersect the country, together with the springs, have had no small effect upon the agriculture of this district. The northern and north-east districts produce lime-stone in abundance; marl is found towards the south. Besides water and coal, this county also produces stone of various denominations. Near Lancaster (upon the common) is an extensive quarry of excellent free-stone, which admits of a fine polish. The county town (Lancaster) is built wholly of this stone. Flags and grey slates are dug up at Holland, near Wigan. Blue slates are got in large quantities in the mountains, called Conistone and Telberthwaite, fells near Hawkshead. Great quantities are exported. They are chiefly distinguished into three classes, viz. London, country, and tom slate, which are valued in proportion, London best, &c. Copper mines in the north have been worked, but without much success. The best scythe-stones are obtained at Rainford, well wrought on the spot. Iron ore, in large quantities, is obtained at Lindle, between Ulverstone and Dalton. The features of this county are in many places strongly marked; towards the north they are bold and picturesque, diversified with lofty mountains and fertile vales. The north-east part of the county is rugged, interspersed with many rivulets, with a thin stratum of upper soil: the southern part more softened, and the plains mose fertilized: along the sea coast, the land is chiefly flat, and has the appearance, in many places, as if formerly covered by the ocean. Few countries produce greater varieties of soil, which yet does not change so rapidly as in some others. A considerable tract, which lies between the Ribble and the Mersey, is a sandy loam, well adapted to the production of almost every vegetable that has yet been brought under cultivation; beneath which is a clay or marl. There is also a black sandy loam, something distinct from the above description, which has no red rock, but the substratum white sand, under which is clay, and then marl. There are also tracks of white sand lands, and some little pebbly-gravel lands. There are many large tracts, which come under the denomination of mosses, and some stiff, but not obdurate clay lands. Lancaster is divided into six hundreds, which contain sixty-three parishes, and twenty-seven market towns. It contains about 1,150,000 acres of land, and in 1800 it had 672,730 inhabitants, of whom more than 160,000 were men capable of bearing arms. The towns are Lancaster, Liverpool, Preston, Wigan, Newton, Clithero, all which are boroughs, and send two members each to the British parliament, making, with two for the country, fourteen in the whole; other towns are Manchester, Blackburn, Bolton, Burnlay, Bury, Cartmel, Chorley, Colne, Dalton, Garstang, Haslingden, Hawkshead, Kirkham, Leigh, Ormskirk, Poulton, Prescot, Rochedale, Ulverstone, and Warrington. The principal rivers are the Lon or Lune, Ribble, Mersey, Weaver, and Irwell.

Lancashire *Asphodel*, in botany. See Narthrecium.

Lancaster, the county town of Lancashire, with a market on Saturday. It is governed by a mayor; sends two members to parliament; and is seated on the Lon, which here forms a port for vessels of moderate burden, and over which is a stone bridge of five arches. It has but one church, on the side of a hill, on the summit of which is the castle, serving both as the shire-house and the county-gaol. On the top of this castle is a square tower, called John of Gaunt's Chair, whence there is a fine prospect of the mountains of Cumberland, and the view toward the sea, extending to the Isle of Man. Five miles from this place is Dunald-Mill-Hole, a cave at the foot of a mountain, into which a large brook runs, after it has driven a mill near its entrance. Some of its vaults are so high that they resemble the roof of a church, and in other parts so low, that they can be passed only by creeping on the hands and feet. Lancaster has about 1600 inhabited houses, and rather more than 9,000 inhabitants, about one-fifth of whom are entitled to vote for the Borough representatives. This town carries on a considerable trade, especially to the West Indies; and is noted for the making of mahogany cabinet ware. It is 68 miles S. of Carlisle, and 235 NNW. of London. Lon. 2. 56. W. Lat. 54. 4. N.

Lancaster, a county of Pennsylvania, 41 miles long and 40 broad. In 1790, it contained 36,147 inhabitants.

Lancaster, the capital of a county of the same name, in Pennsylvania. Beside its churches, and other public buildings, it contains a college founded in 1787, and named Franklin college, after the late Dr. Franklin. It is a place of considerable trade, seated on the Conestogo Creek, near the river Susquehannah, 66 miles W. by N. of Philadelphia. Lon. 76. 17. W. Lat. 40. 2. N.

LANCE. *s.* (*lance*, French; *lancea*, Latin.) A long spear (*Sidney*).

To LANCE. *v. a.* (from the noun.) 1. To pierce; to cut (*Shakspeare*). 2. To open chirurgically; to cut in order to cure (*Dryden*).

LANCE, in Ichthyology. See Launce.

Lance-wood, in botany. See Cabbage-Tree.

LA'NCELY. *a.* (from *lance.*) Suitable to a lance: not in use (*Sidney*).

LANCEOLATE Leaf. In botany. Oblongum utrinque sensim versus extremitatem attenuatum. Oblong, and gradually tapering towards each extremity: like the head of a lance.—Exemplified in Plantago lanceolata. — Some call it spear-shaped, others lance-shaped or lanced; but lanceolate appears in all respects preferable.—It is applied also to the Stipule, Bracte, and Perianth.

Lanceolate-ovate leaf; partaking of both forms, or between both; but inclining more to the latter. An ovate lanceolate leaf, on the contrary, would incline more to the lanceolate. This is a general rule with respect to these compound words.

LANCEPE'SADE. *s.* (*lance spezzate*, Fr.) The officer under the corporal (*Cleaveland*).

LANCEROTA, one of the Canary Isles, about 15 miles long and 10 broad. It is very high, and may be discovered at a great distance. Long. 13. 26. W. Lat. 29. 14. N.

LA'NCET. *s.* (*lancette*, French.) A small pointed chirurgical instrument. See Surgery.

To LAUNCH. *v. n.* (*lancer*, French. This word is too often written *launch.*) To dart; to cast as a lance; to throw; to let fly (*Pope*).

LANCH, or Launch, a peculiar sort of long-boat, used by the French, Spanish, and Italian shipping, and in general by those of other European nations when employed in voyaging in the Mediterranean sea. A launch is proportionably longer, lower, and more flat-bottomed than the long-boat; it is by consequence less fit for sailing, but better calculated for rowing and approaching a flat shore. Its principal superiority to the long-boat, however, consists in being by its construction much fitter to under run the cable; which is a very necessary employment in the harbours of the Levant sea, where the cables of different ships are fastened across each other, and frequently render this exercise extremely necessary.

Lanch, is also the movement by which a ship or boat descends from the shore, either when she is at first built, or at any time afterwards.

LANCIANO, a town of Naples, in Abruzzo Citeriore, with an archbishop's see. It is famous for its fairs in July and August; and is seated on the Feltrino, 87 miles N. E. of Naples. Long. 14. 50. E. Lat. 42. 18. N.

LANCINA'TION. *s.* (from *lancino*, Latin.) Tearing; laceration.

To LA'NCINATE. *v. a.* (*lancino*, Latin.) To tear; to rend; to lacerate.

LAND. *s.* (lanᴅ, Saxon.) 1. A country; a region, distinct from other countries (*Spenser*). 2. Earth, distinct from water (*Abbot*). 3. Ground; surface of the place (*Locke*). 4. An estate real and immoveable (*Knolles*). 5. Nation; people (*Dryden*). 6. Urine. An old word (*Shakspeare*).

To LAND. *v. a.* (from the noun.) To set on shore (*Dryden*).

To LAND. *v. n.* To come to shore (*Bac.*)

Land, *Flooding*. See Irrigation and Husbandry.

Land, in the sea-language, makes part of several compound terms; thus, land-laid, or, to lay the land, is just to lose sight of it. Land-locked, is when land lies all round the ship, so that no point of the compass is open to the sea. If she is at anchor in such a place, she is said to ride land-locked, and is therefore concluded to ride safe from the violence of the winds and tides. Land-mark, any mountain, rock, steeple, tree, &c. that may serve to make the land known at sea. Land is shut in, a term used to signify that another point of land hinders the sight of that from which the ship came. Land-to, or the ship lies land-to; that is, she is so far from shore, that it can only just be discerned. Land-turn is a wind that in almost all hot countries blows at certain times from the shore in the night. To set the land; that is, to see by the compass how it bears.

Land-Tax, one of the annual taxes raised upon the subject. See Tax. The land-tax, in its modern shape, has superseded all the former methods of rating either property, or persons in respect of their property, whether by tenths or fifteenths, subsidies on land, hydages, scutages, or talliages. Many of the ancient levies were in the nature of a modern land-tax; for we may trace the original of that charge as high as to the introduction of our military tenures; when every tenant of a knight's fee was bound, if called upon, to attend the king in his army for forty days in every year. In lieu of this personal attendance, a pecuniary satisfaction came to be levied by assessments, at so much for every knight's fee, under the name of scutages. See Escuage. Of the same nature with these were the assessments of hydage or hidage upon all other lands, and of talliage upon cities and boroughs. But they all gradually fell into disuse, upon the introduction of subsidies, about the time of king Richard II. and

king Henry IV. See SUBSIDY. In lieu of subsidies, which were usually raised by commissioners appointed by the crown, or the great officers of state, the parliament, in the beginning of the civil wars, introduced the practice of laying weekly and monthly assessments of a specific sum upon the several counties of the kingdom, to be levied by a pound rate on lands and personal estates; which were occasionally continued during the whole usurpation, sometimes at the rate of 120,000l. a month, sometimes at inferior rates. After the Restoration, the ancient method of granting subsidies, instead of these monthly assessments, was twice, and twice only renewed, viz. in 1663, when four subsidies were granted by the laity, and four by the clergy; and in 1670, when 800,000l. was raised by way of subsidy, which was the last time of raising supplies in this manner. The monthly assessments being established by custom, raised by commissioners named by parliament, and producing a more certain revenue, subsidies were discontinued, and occasional assessments granted, as emergencies required. These periodical assessments, the subsidies which preceded them, and the more ancient scutage, hydage, and talliage, says Judge Blackstone, were to all intents and purposes a land-tax; and the assessments were sometimes expressly called so. However, in the year 1692, a new assessment or valuation of estates was made throughout the kingdom, which, though by no means a perfect one, had this effect, that a supply of 500,000l. was equal to 1s. in the pound of the value of the estates given in. And, according to this enhanced valuation, from the year 1693 to the present, the land-tax has continued an annual charge upon the subject; above half the time at 4s. in the pound, sometimes at 3s.; sometimes at 2s.; twice, viz. in 1732 and 1733, at 1s. but without any total intermission. The medium has been 3s. 3d. in the pound, being equivalent to 23 ancient subsidies, and amounting annually to more than a million and a half of money. The different rates, at various periods, are stated below.

In 1698 and 1699, at 3s.
1700, at 2s.
1701, at 3s.
1702 to 1712, at 4s.
1713 to 1715, at 2s.
1716, at 4s.
1717 to 1721, at 3s.
1722 to 1726, at 2s.
1727, at 4s.
1728 and 1729, at 3s.
1730 and 1731, at 2s.
1732 and 1733, at 1s.
1734 to 1739, at 2s.
1740 to 1749, at 4s.
1750 to 1752, at 3s.
1753 to 1755, at 2s.
1756 to 1766, at 4s.
In 1767 to 1770, at 3s.
1771, at 4s.
1772 to 1775, at 3s.
1776 to 1798, at 4s.

The sums to be raised at 4s. in the pound were stated, in the annual act, at 1,989,673l. 7s. 10½d. for England, and 47,954l. 1s. 2d. for Scotland, making together 2,037,627l. 9s. 0¼d.; and upon credit of this assessment 2,000,000l. was annually borrowed of the Bank in anticipation of the tax, for which sum exchequer-bills were given them, which were to be discharged out of the produce of the tax as it came in; but the full amount of the assessment was seldom, if ever, collected, so that the nett payments into the exchequer always fell short of the sum borrowed on the credit thereof, exclusive of interest on the bills; and the deficiency was made good out of the supplies for the next year.

In 1798, the current value of the public funds having been unusually depressed for some time past, and apprehensions being entertained that the further increase of the funded debt would be attended with peculiar inconvenience, unless some mode was discovered of counteracting its effects, a project was adopted of offering the land-tax for redemption or sale. With this view an act was passed, making the land-tax a perpetual tax, from 25th of March, 1799; and being thus converted into a permanent annuity, it was offered for sale to the proprietors of the lands upon which it was charged; or if they declined it, to any other person who chose to become a purchaser. In the first case it was considered as a redemption of the tax, the estate becoming in future wholly freed from it; in the latter case the purchaser became entitled to receive the land-tax regularly from the receiver-general, half-yearly, on the 16th of March and 20th of September, in every year. The consideration to be given in either case was not to be in money, but stock, either in the three per cent. consols, or three per cent. reduced, to be transferred to the commissioners for the reduction of the national debt. The quantity of stock to be transferred for redemption of the tax by persons interested in the land on which it was charged, was so much capital as yielded an annuity or dividend exceeding the amount of the tax to be redeemed by one-tenth part thereof; and the stock to be transferred for purchase of the tax by persons not interested in the land, was so much capital as yielded an annuity or dividend exceeding the tax to be purchased by one-fifth part thereof. Thus the amount of three per cent. stock to be transferred for 10l. per annum tax was 366l. 13s. 4d. for redemption, or 400l. for purchase.

This scheme was adopted with the view of facilitating the raising of money on loan, by absorbing a large quantity of floating

stock, and thus raising the current price; while at the same time it would be attended with an increase of revenue. This at least was the avowed object of the measure, which it was estimated would be the means of redeeming or taking out of the market about 80,000,000l. of stock; the advantages offered by it were, however, by no means such as to induce a general approval of it, many persons subject to the tax declined redeeming it, and but few were inclined to become purchasers. The period first limited was several times extended, but the plan succeeded very imperfectly, and on the first of February, 1803, the total amount of three per cent. stock, which had been transferred for the redemption of land-tax, was only 21,794,307l. 17s. 3d.

LANDAFF, a small place in Glamorganshire, but honoured with the appellation of a city, on account of its being an episcopal see. It is seated on an ascent, on the river Taafe, near Cardiff; but the cathedral, a large stately building, stands on low ground. It is 30 miles N. W. of Bristol, and 166 W. of London. Lon. 3. 10. W. Lat. 51. 24. N.

LANDAU, a strong town of Germany, in the palatinate of the Rhine. It was formerly imperial, but was ceded to the French in 1648. It sustained a severe bombardment by the allies, in 1793; but they were compelled to raise the siege. It is seated on the Queich, nine miles S. by E. of Neustadt, and 270 E. of Paris. Lon. 8. 10. E. Lat. 49. 12. N.

Landau, a town of Germany, in the circle of Upper Rhine, 12 miles N. of Waldeck, and 34 S. S. E. of Paderborn.

LA'NDED. *a.* (from *land.*) Having a fortune in land (*Shakspeare*).

LANDEN, a town of Austrian Brabant, famous for a battle gained by the French, over the allies, July 29, 1693, and for a battle fought March 18, 1793, between the Austrians and French, by which the latter were compelled to evacuate the Austrian Netherlands. Landen is seated on the Becke, 17 miles N.W. of Huy, and 18 N. E. of Namur. Lon. 5. 5. E. Lat. 52. 41. N. See Neerwinden.

Landen (John), an eminent mathematician, was born at Peakirk, near Peterborough in Northamptonshire, in January 1719. He became very early a proficient in the mathematics, for we find him a very respectable contributor to the Ladies Diary in 1744; and he was soon among the foremost of those who then contributed to the support of that small but valuable publication, in which almost every English mathematician who has arrived at any degree of eminence for the best part of this century, has contended for fame at one time or other of his life. Mr. Landen continued his contributions to it at times, under various signatures, till within a few years of his death.

It has been frequently observed, that the histories of literary men consist chiefly of the history of their writings; and the observation was never more fully verified, than in the present article concerning Mr. Landen. All that we have to relate in the way of event, is that Mr. Landen lived in the earlier part of his life, as a farmer, at the village of Walton, near Peterborough; where also, he gave instructions in mathematics, to young men in the neighbourhood: among those whom he thus assisted with his instruction and advice, were Mr. Thomas Bosworth, afterwards master of the Charity School at Peterborough, and Mr. Richard Weston, afterwards for many years master of a large boarding-school at Yaxley; both of them respectable mathematicians. From Walton, Mr. Landen removed about 1762 to Milton, the seat of earl Fitzwilliam, to undertake the business of land steward to that amiable nobleman, in this situation he remained till within a year or two of his death.

In the 48th volume of the Philosophical Transactions, for the year 1754, Mr. Landen gave "An Investigation of some theorems which suggest several very remarkable properties of the Circle, and are at the same time of considerable use in resolving Fractions, the denominators of which are certain Multinomials, into more simple ones, and by that means facilitate the computation of Fluents." This ingenious paper was delivered to the Society by that eminent mathematician Mr. Thomas Simpson of Woolwich, a circumstance which will convey to those who are not themselves judges of it, some idea of its merit.

In the year 1755, he published a volume of about 160 pages, intitled Mathematical Lucubrations. The title to this publication was made choice of, as a means of informing the world, that the study of the mathematics was at that time rather the pursuit of his leisure hours than his principal employment: and indeed it continued to be so, during the greatest part of his life. These Lucubrations contain a variety of tracts relative to the rectification of curve lines, the summation of series, the seeing of fluents, and many other points in the higher parts of the mathematics. About the latter end of the year 1757, or the beginning of 1758, he published proposals for printing by subscription "The Residual Analysis, a new branch of the Algebraic art:" and in 1758 he published a small tract in quarto, entitled "A Discourse on the Residual Analysis," in which he resolved a variety of problems, to which the method of fluxions had been usually applied, by a mode of reasoning entirely new; compared those solutions with solutions of the same problems, investigated by the fluxionary method; and showed that the solutions by his new method were, in general, more natural and elegant than the fluxionary ones.

In the 51st volume of the Philosophical Transactions, for the year 1760, he gave "A new method of computing the sums of a great number of infinite series." This paper was also presented to the society by his ingenious friend the late Mr. Thomas Simpson. In 1764, he published the first book of "The Residual Analysis," in a 4to. volume of 218 pages, with several copperplates. In this treatise, besides explaining the principles which his new analysis was founded on, he applied it to drawing tangents and finding the properties of curve-lines; to describing their involutes and evolutes, finding the radius of curvature, their greatest and least ordinates, and points of contrary fluxure; to the determi-

nation of their cusps, and the drawing of asymptotes: and he proposed in a second book to extend the application of this new analysis to a great variety of mechanical and physical subjects.' The papers which were to have formed this book lay long by him; but he never found leisure to put them in order for the press.

On the 16th of January 1766, Mr. Landen was elected a fellow of the Royal Society, and admitted on the 24th of April following. In the 58th volume of the Philosophical Transactions, for the year 1768, he gave a "Specimen of a new method of comparing curvilineal areas: by means of which many areas did not appear to be comparable by any other method;" a circumstance of no small importance in that part of natural philosophy which relates to the doctrine of motion. In the 60th volume of the same work, for the year 1770, he gave "Some new theorems for computing the whole areas of curve-lines, where the ordinates are expressed by fractions of a certain form," in a more concise and elegant manner than had been done by Cotes, De Moivre, and others who had considered the subject before him. In the 61st volume, for 1771, he has investigated several new and useful theorems for computing certain fluents, which are assignable by arcs of the conic sections. This subject had been considered before both by Mr. Maclaurin and Mr. D'Alembert; but some of the theorems which were given by these celebrated mathematicians, being in part expressed by the difference between an arc of an hyperbola and its tangent, and that difference being not directly attainable when the arc and its tangent both become infinite, as they will do when the whole fluent is wanted, although such fluent be finite; these theorems therefore fail in those cases, and the computation becomes impracticable without farther help. This defect Mr. Landen has removed by assigning the limit of the difference between the hyperbolic arc and its tangent, while the point of contact is supposed to be removed to an infinite distance from the vertex of the curve. And he concludes the paper with a curious and remarkable property relating to pendulous bodies, which is deducible from those theorems. In the same year he published "Animadversions on Dr. Stewart's computation of the sun's distance from the earth;" a clever pamphlet, but couched in far more acrimonious and scornful language than any man ought to employ when writing against so excellent a geometer as Dr. Stewart.

In the 65th volume of the Philosophical Transactions, for 1775, he gave the investigation of a general theorem, which he had promised in 1771, for finding the length of any arc of a conic hyperbola by means of two elliptic arcs; and observes, that by the theorems there investigated, both the elastic curve and the curve of equable recess from a given point, may be constructed on those cases where Mr. Maclaurin's elegant method fails. In the 67th volume, for 1777, he gave "A new theory of the motion of bodies revolving about an axis in free space, when that motion is disturbed by some extraneous force, either percussive or accelerative." At this time he did not know that the subject had been handled by any person before him; and he considered only the motion of a sphere's spheroid and cylinder. The publication of this paper, however, was the cause of his being told, that the doctrine of rotatory motion had been considered by M. D'Alembert; and purchasing that author's Opuscules Mathematiques, he there learned that M. D'Alembert was not the only one who had considered the matter before him; for M. D'Alembert there speaks of some mathematician, though he does not mention his name, who, after reading what had been written on the subject, doubted whether there be any solid whatever, beside the sphere, in which any line, passing through its centre of gravity, will be a permanent axis of rotation. In consequence of this, Mr. Landen took up the subject again; and though he did not then give a solution to the general problem, viz. "To determine the motions of a body of any form whatever, revolving without restraint about any axis passing through its centre of gravity," he fully removed every doubt of the kind which had been started by the person alluded to by M. D'Alembert, and pointed out several bodies, which, under certain dimensions, have that remarkable property. This paper is given, among many others equally curious, in a volume of Memoirs which he published in the year 1780. But what renders that volume yet more valuable, is a very extensive appendix, containing "Theorems for the calculation of fluents." The tables which contain these theorems are more complete and extensive than any which are to be found in any other author, and are chiefly of his own investigating; being such as had occurred to him in the course of a long and close application to mathematical studies in almost every branch of those sciences. In 1781, 1782, and 1783, he published three little tracts on the summation of converging series, in which he explained and showed the extent of some theorems which had been given for that purpose by M. de Moivre, Mr. Sterling, and his old friend Thomas Simpson, in answer to some things which he thought had been written to the disparagement of those excellent mathematicians. It was the opinion of some, that Mr. Landen did not show less mathematical skill in explaining and illustrating these theorems, than he has done in his writings on original subjects; and that the authors of them were as little aware of the extent of their own theorems as the rest of the world were, before Mr. Landen's ingenuity made it obvious to all. At this period, too, he was engaged in a controversy with Dr. Henry Clarke, in consequence of that gentleman's publishing a translation of Longna's Treatise on the Summation of Series. This controversy was conducted with much talent, but far too much warmth and anger on both sides. The pamphlets, however, are nearly forgotten; and the world has yet to learn that the terms of mathematics and those of Billingsgate, are convertible, and admit of mutual substitution.

About the beginning of the year 1782, Mr. Landen had made such improvements of his theory of rotatory motion, as enabled him, he thought, to give a solution of the general problem specified above; but finding the result of it to differ very materially from the result of the solution which had been given of it by M. D'Alembert, and being not able to see clearly where that gentleman had erred, he did not venture to make his own solution public. In the course of that year, having procured the Memoirs of the Berlin Academy for 1757, which contain M. Euler's solution of the problem, he found that this gentleman's solution gave the same result as had been deduced by M. D'Alembert; but the perspicuity of M. Euler's manner

of writing enabled him to discover where he had erred, which the obscurity of the other did not permit. The agreement, however, of two writers of such established reputation as M. Euler and M. D'Alembert, made him long dubious of the truth of his own solution, and induced him to revise the process again and again with the utmost circumspection; and being every time more convinced that his own solution was right and theirs wrong, he at length gave it to the public in the 75th volume of the Philosophical Transactions, for 1785.

The extreme difficulty of the subject, joined to the concise manner in which Mr. Landen had been obliged to give his solution, in order to confine it within proper limits for the Transactions, rendered it too difficult, or at least too laborious a piece of business for most mathematicians to read it; and this circumstance, joined to the established reputation of Euler, induced many to think that his solution was right and Mr. Landen's wrong; and there did not want attempts to prove it. But notwithstanding these attempts were manifestly wrong, and that every one who perused them saw it, they convinced Mr. Landen that there was a necessity for giving his solution at greater length, in order to render it more generally understood. About this time also he met by chance with the late P. Frisi's Cosmographiæ Physicæ et Mathematicæ; in the second part of which there is a solution of this problem, agreeing in the result with those of M. Euler and D'Alembert, which is not suprising, as P. Frisi employs the same principle that they did. Here Mr. Landen learned that M. Euler had revised the solution which he had given formerly in the Berlin Memoirs, and given it another form and at greater length in a volume published at Gryphiswell in 1765, entitled, Theoria Motus corporum solidorum seu rigidorum. Having therefore procured this book, Mr. Landen found the same principles employed in it, and of course the same conclusion resulting from them that he had found in M. Euler's former solution of the problems: but as the reasoning was given at greater length, he was enabled to see more distinctly how M. Euler had been led into the mistake, and to set that mistake in a stronger point of view. As he had been convinced of the necessity of explaining his ideas on the subject more fully, so he now found it necessary to lose no time in setting about it. He had for several years been severely afflicted with the stone in the bladder, and toward the latter part of his life to such a degree as to be confined to his bed for more than a month at a time; yet even this dreadful disorder did not very materially abate his ardour for mathematical studies; for the second volume of his Memoirs was written and revised during the intervals of his disorder. This volume, beside a solution of the general problem concerning rotatory motion, contains the resolution of the problem concerning the motion of a top; an investigation of the motion of the equinoxes, in which Mr. Landen has first of any one pointed out the cause of Sir Isacc Newton's mistake in his solution of this celebrated problem; and some other papers of considerable importance. He just lived to see this work finished, and received a copy of it the day before his death, which happened on the 15th of January 1790, at Milton, near Peterborough, in the 71st year of his age.

As a mathematician Mr. Landen stands far above *our* praise: his talents were of the first order, and his application almost unequalled. Yet, he was far from an elegant writer: he often failed in perspicuity, and *always* in regard for those who had to learn. His contempt for those who knew less than himself was excessive, disgusting, and surely unreasonable: for had the talents or genius of all mathematicians been equal to his, he could have attained no relative eminence, no distinction; and without that distinction his contempt would have had no sustentacle on which to erect itself. He had too an aukward knack at stabbing the reputation of others with notes of admiration, in this manner:

"Emerson blundered here!"

"What a goose was Heath to fall into such a mistake!"

"Mr. Emerson has touched upon this subject; but his reasoning thereon is *false!*"

"This proposition and Leonhard Euler's 11th problem, &c. are to the same purport, but our conclusions are very different!"

"Mr. Euler, without any explanatory reasoning! without any regard to the inclinations of the two planes with respect to the centre of gravity of the body!" &c.

"The errors here noticed Mr. Euler has repeated in his 13th and 15th problems!"

"His general theory is most egregiously erroneous!"

"That" *he* "should err so greatly, and so repeatedly, I must say, seems *very extraordinary!*"

Such are the rhetorical beauties which Mr. Landen scatters in almost every page. Notwithstanding all this, however, we are inclined to believe that Euler will be remembered as long as Mr. Landen.—His manners in private life were very consistent with these specimens: insomuch that the strange contrast of his haughty and assuming airs, with the urbanity, mildness, and benevolence of his noble employer, would cause the villagers to exclaim as they passed together, "There goes Lord Landen and Mr. Fitzwilliam."

Mr. Landen left one daughter, who is now, we believe, living in the neighbourhood of Peterborough. His manuscripts, we are sorry to say, for many of them doubtless were valuable, were sold to the cheesemongers and tallow-chandlers of that city, and thence distributed among the inhabitants, in a very different manner from any which the author had in contemplation.

LA'NDFALL. *s.* (*land* and *fall.*) A sudden translation of property in land by the death of a rich man.

LA'NDFLOOD. *s.* (*land* and *flood.*) Inundation (*Clarendon*).

LA'ND-FORCES. *s.* (*land* and *forces.*) Warlike powers not naval; soldiers that serve on land (*Temple*).

LANDGRAVE (formed of the German land, "earth," and graff or grave, "judge" or "count"), a name formerly given to those who executed justice in behalf of the emperors, with regard to the internal policy of the country. The title does not seem to have been used before the 11th century. These judges were first appointed within a certain district of Germany: in process of time the title became hereditary, and these judges assumed the sovereignty of the se-

veral districts or countries over which they presided. Landgrave is now applied by way of eminence to those sovereign princes of the empire who possess, by inheritance, certain estates called *landgravates*, and of which they receive the investiture of the emperor. There are four princes who have this title, viz. those of Thuringia, Hessia, Alsace, and Leuchtenberg. There are also other landgraves who are not princes, but counts of the empire. See COUNT.

LANDGUARD FORT, a fort of England, situated on a point of land, at the south-east extremity of the county of Suffolk, at the mouth of the rivers Orwell and Stour, opposite Harwich, and furnished with a garrison, under the command of a governor, and a platform of guns, to defend the coast.

LA'NDHOLDER. *s.* (*land* and *hold.*) One who holds land (*Locke*).

LA'NDJOBBER. *s.* (*land* and *job.*) One who buys and sells lands for other men (*Swift*).

LA'NDING. } *s.* (from *land.*) The
LA'NDING-PLACE, } top of stairs (*Add.*)

LA'NDLADY. *s.* (*land* and *lady.*) 1. A woman who has tenants holding from her. 2. The mistress of an inn (*Swift*).

LA'NDLESS. *a.* (from *land.*) Without property; without fortune (*Shakspeare*).

LA'NDLOCKED. *a.* (*land* and *lock.*) Shut in, or enclosed with land (*Addison*).

LA'NDLOPER. *s.* (*land* and *loopen*, Dutch.) A landman; a term of reproach used by seamen of those who pass their lives on shore.

LA'NDLORD. *s.* (*land* and *lord.*) 1. One who owns lands or houses, and has tenants under him (*Spenser*). 2. The master of an inn (*Addison*).

LA'NDMARK. *s.* (*land* and *mark.*) Any thing set up to preserve boundaries (*Dry.*)

LANDRECY, a town of France, in the department of the North, and late province of Hainault. It was besieged in vain by prince Eugene, in 1712. It was taken by the allies in April 1794; but retaken in July following. It is seated on the Sambre, 18 miles S.W. of Maubeuge, and 100 N. by E. of Paris. E. long. 3. 47. N. lat. 50. 7.

LANDSCAPE, in painting, the view or prospect of a country extended as far as the eye will reach. See PAINTING and DRAWING.

LANDSCROON, a sea-port town of Sweden, in South-Gothland, and territory of Schonen, seated on the Baltic Sea, within the Sound, 22 miles north of Copenhagen. E. lon. 12. 46. N. lat. 55. 52.

LANDSDOWN, a place in Somersetshire, near Bath, with a fair on October 10th for cattle and cheese.

LAND'S-END, a promontory of Cornwall, the most westerly point of Great Britain. According to the Requisite Tables, the Lon. is 5. 15. W. Lat. 49. 57. 30. N.

LANDSHUT, a strong town of Germany, in Lower Bavaria, with a strong castle on an adjacent hill. It is seated on the river Iser, in E. lon. 1. 15. N. lat. 48. 23. There is another small town of the same name in Silesia, and in the duchy of Schweidnitz, seated on the river Zieder, which falls into the Bauber: and there is also another in Moravia, seated on the river Morave, on the confines of Hungary and Austria.

LA'ND-WAITER. *s.* (*land* and *waiter.*) An officer of the customs, who is to watch what goods are landed (*Swift*).

LA'NDWARD. *ad.* (from *land.*) Toward the land (*Sandys*).

LANE. *s.* (*laen*, Dutch.) 1. A narrow way between hedges (*Locke*). 2. A narrow street; an alley (*Sprat*). 3. A passage between men standing on each side (*Bacon*).

LANERK, a town of Scotland, which gives name to the county, situated on the north-east side of the Clyde; near it are some celebrated falls, or cataracts, in that river, which, especially in rainy seasons, form a tremendous appearance. Here the brave Wallace first meditated to revenge the wrongs of his country, and slew the governor, who mas a wan of rank. In the neighbourhood are some of the greatest cotton manufactures of Scotland: 19 miles S.E. Glasgow. Long. 3. 49. W. Lat. 55. 43. N.

LANERKSHIRE, a county of Scotland, bounded on the north by Dumbartonshire, on the north-east by Selkirkshire, Linlithgowshire, and Edinburghshire; on the east by Peebleshire, on the south by Dumfriesshire, on the south-west by Ayrshire, and on the west, toward the north, by the Clyde; 40 miles long, and about 22 in its mean breadth. Its form has been fancifully compared to that of a vine-leaf; the mouth of the Clyde supposed to represent the stem, the course of that river the middle vein, and the lesser streams its collateral branches. The river Clyde, descending from the southern part of this county, divides it into two equal parts, the one called the Shire of Lanerk, and the other the Barony of Glasgow; the one hilly, heathy, and fit for pasture; and the other level, and proper for corn. The principal rivers, all of which rise on the same hill, are the Clyde and the Annan, both of which run into the Irish Sea; also, the Tweed, which falls into the German Ocean: besides which, the Frith of Clyde is joined to the Frith of Forth by a canal, for the benefit of navigation and trade. It abounds with coal and limestone; has some lead mines, and abundance of lapis lazuli is dug up here. The chief towns are Glasgow, Hamilton, Lanerk, and Rutherglen. The population, in 1801, amounted to 147,796.

LANFRANC, archbishop of Canterbury, was born at Pavia, and studied at Bologna, after which he went to France, where he retired to the abbey of Bec, of which he was elected prior in 1044. William, duke of Normandy, made him abbot of St. Stephen, at Caen; and when he conquered

England, preferred him to the see of Canterbury. In 1071, he went to Rome, to receive the pallium from the pope; but it must be observed, to his honour, that he stoutly resisted the authority of Gregory VII. who repeatedly cited him to Rome, to answer the charge of heresy brought against him. He rebuilt the cathedral of Canterbury, and founded several other churches and hospitals. He died in 1089. He wrote a book against Berenger, and other works, which were collected into a volume, in 1647.

LANGANICO, or Sunri, anciently Olympia, a town of European Turkey, in the Morea, situated on a small river called Carbon, the ancient Alpheus. This was once a city of great note, near which, on the Olympian plain, were celebrated the games so called, which were first instituted by Pelops, in honour of Jupiter, and afterwards revived by Atreus and Hercules. They were held every fifth year, with great solemnity, amidst an infinite number of spectators, and lasted for five whole days together. From these spectacles, the computation of time in Greece, by Olympiads, took its rise. In this city, also, was a very fine temple of Jupiter Olympus, with a celebrated image of that god, fifty ells high, which was reckoned one of the seven wonders of the world. It is 32 miles S. S. E. of Chiarenza, and 60 S. W. of Corinth.

LANGBAINE (Gerrard), a learned English divine, was born in Westmoreland, about 1608, and educated at Queen's college, Oxford, where he obtained a fellowship, and proceeded to the degree of D. D. He printed an edition of Longinus at Oxford, in 1636, and several other learned works afterwards. In 1645, he was chosen provost of his college, which, with the office of keeper of the archives, he held to his death in 1657. He was held in great esteem by Selden, Usher, and other eminent scholars of that period.

LANGELAND, an island of Denmark, in the strait called the Great Belt. It is 33 miles long, but scarcely five in breadth, and produces plenty of corn. The principal town is Rutcoping. Lon. 11. 0. E. Lat. 55. 4. N.

Langeland (Robert), a very old English poet, and one of the first disciples of Wickliffe. He distinguished himself by a curious poem, entitled, The Visions of Pierce Plowman, written about 1369, intended as a satire on almost every description of men, but especially the clergy. It is written in blank verse, with considerable force and humour, and in an alliterative measure.

LANGENTHAL, a town of Swisserland, in the canton of Berne. Here are three great annual fairs, at which great quantities of linen, as also cattle, cheese, and grain, are sold. Near the town are some medicinal springs. It is 10 miles E. of Soleure, and 18 N. E. of Berne.

LANGHORNE (Dr. John), an ingenious English divine and poet, was born at Kirby Steven, in Westmoreland, and on entering into orders became tutor to the sons of a Lincolnshire gentleman, whose daughter he married. He held the living of Blagden, in Somersetshire, and was besides a justice of the peace at the time of his death, which happened in 1779. He published, 1. Poems, in 2 vols. 12mo.; 2. Theodosius and Constantia, 2 vols. 12mo.; 3. Solyman and Almena, a tale; 4. Frederic and Pharamond, 12mo.; 5. Sermons, 2 vols.; 6. Effusions of Fancy, 2 vols.; 7. Fables of Flora, in verse; 8. A translation of Plutarch's Lives, of which a new edition has been lately published, by the Rev. F. Wrangham.

LANGIONE, a city, deemed by some the capital, of the kingdom of Laos, with a magnificent royal palace, seated on a small river, 140 miles S. E. of Ava. Lon. 101. 15. E. Lat. 21. 12. N.

LANGIUS (John), a physician of Silesia, was born in 1485, and took his degree at Pisa, after which he practised at Heidelberg, and became physician to four electors palatine. He died in 1565. He published at Basil, in 4to. 1554, Medical Epistles, which abound with curious matter, and are worth perusal.

LANGLEY (Batty), an English architect, who died in 1751. He published many useful practical books, as the Builder's Jewel; the Builder's Price-Book; and other works for masons, bricklayers, and carpenters.

LANGOGNE, a town of France, in the department of Lozere, 21 miles N. E. of Mende, and 33 W. of Privas. Lon. 3. 45. E. Lat. 44. 44. N.

LANGON, a town of France, in the department of Gironde. It is noted for excellent wine, and seated on the Garonne, 15 miles N. or Bazas. Lon. 0. 10. W. Lat. 44. 33. N.

LANGPORT, a town in Somersetshire, with a market on Saturday. It is seated on a hill, by the river Parret, which is navigable for barges to Bridgewater. It is 10 miles S. E. of Bridgewater, and 128 W. by S. of London. Lon. 3. 0. W. Lat. 51. 0. N.

LANGRES, an ancient town of France, in the department of Upper Marne, with a bishop's see. It is seated on a mountain, near the sources of the Marne, and its cutlery wares are in high esteem. This town is thought to stand the highest of any in France; and the prospect from the towers of the principal church is beyond conception. It is 35 miles N. E. of Dijon, and 100 S. by E. of Rheims. Lon. 5. 24. E. Lat. 47. 52. N.

LANGTON (Stephen), archbishop of Canterbury, was born in England, but educated at Paris. He was chancellor of Paris, cardinal of Rome, and made bishop of Canterbury by the pope, in opposition to king John and the clergy. John forbade Langton from entering his dominions, and banished the monks of Canterbury, for which the

kingdom was laid under the papal interdict. The king was afterwards particularly excommunicated, and his subjects absolved from their allegiance. He then found it necessary to make his submission, to receive the archbishop, and to restore the monks. Langton was a haughty prelate, wholly devoted to the papal chair; however, he was a man of great learning, and wrote several books, which we have not room to enumerate. He died in 1228.

LANGUAGE, in the proper sense of the word, signifies the expression of our ideas and their various relations by certain articulate sounds, which are used as the signs of those ideas and relations. By articulate sounds are meant those modulations of simple voice, or of sound emitted from the thorax, which are formed by means of the mouth and its several organs; the teeth, the tongue, the lips, and the palate. In a more general sense the word language is sometimes used to denote all sounds by which animals of any kind express their particular feelings and impulses in a manner that is intelligible to their own species.

Nature has endowed every animal with powers sufficient to make known all those of its sensations and desires, with which it is necessary, for the preservation of the individual or the continuance of the kind, that others of the same species should be acquainted. For this purpose, the organs of all vocal animals are so formed, as, upon any particular impulse, to utter sounds, of which those of the same species instinctively know the meaning. The summons of the hen is instantly obeyed by the whole brood of chickens; and in many others of the irrational tribes a similar mode of communication may be observed between the parents and the offspring, and between one animal and its customary associate. But it is not among animals of the same species only that these instinctive sounds are mutually understood. It is as necessary for animals to know the voices of their enemies as the voices of their friends; and the roaring of the lion is a sound of which, previous to all experience, every beast of the forest is naturally afraid. Between these animal voices and the language of men there is however very little analogy. Human language is capable of expressing ideas and notions, which there is every reason to believe that the brutal mind cannot conceive. "Speech," says Aristotle, "is made to indicate what is expedient and what is inexpedient, and in consequence of this what is just and unjust. It is therefore given to men; because it is peculiar to them that of good and evil, just and unjust, they only (with respect to other animals) possess a sense or feeling." The voices of brutes seem intended by nature to express, not distinct ideas or moral modes, but only such feelings as it is for the good of the species that they should have the power of making known; and in this, as in all other respects, these voices are analogous; not to our speaking, but to our weeping, laughing, sighing, groaning, screaming, and other natural and audible expressions of appetite and passion. Another difference between the language of men and the voices of brute animals consists in articulation, by which the former may be resolved into distinct elementary sounds or syllables; whereas the latter, being for the most part unarticulated, is not capable of such a resolution. Hence Homer and Hesiod characterize man by the epithet μεροψ, or, "voice dividing," as denoting a power peculiar to the human species: for though there are a few birds which utter sounds that may be divided into syllables, yet each of these birds utters but one such sound, which seems to be employed rather as notes of natural music than for the purpose of giving information to others; for when the bird is agitated, it utters cries which are very different, and have no articulation. A third difference between the language of men and the significant cries of brute animals, is, that the former is from art and the latter from nature. Every human language is learned by imitation, and is intelligible only to those who either inhabit the country where it is vernacular, or have been taught it by a master or by books: but the voices in question are not learned by imitation; and being wholly instinctive, they are intelligible to all the animals of that species by which they are uttered, though brought together from the most distant countries on earth. That a dog, which had never heard another bark, would notwithstanding bark himself, and that the barkings or yelps of a Lapland dog would be instinctively understood by the dogs of Spain, Calabria, or any other country, are facts which admit not of doubt: but there is no reason to imagine that a man who had never heard any language spoken would himself speak; and it is well known that the language spoken in one country is unintelligible to the natives of another country where a different language is spoken. Herodotus indeed records a fact which, could it be depended upon, would tend to overturn this reasoning, as it infers a natural relation between ideas and certain articulate sounds. He tells us, that Psammetichus, king of Egypt, in order to discover which was the oldest language, caused two children, newly born of poor parents, to be brought up by a shepherd among his cattle, with a strict injunction that they should never hear a human voice; and that at the end of two years the children pronounced at the same time the word βεκκος, which in the Phrygian language signified *bread*. Either this is one of the many fables which that credulous historian collected among the Egyptians, or the conduct and reasoning of Psammetichus were very absurd; for it is added, that from this circumstance he inferred that the Phrygians were the most ancient people, and that they spoke the primitive language. The only rational purpose for which such an experiment could be instituted, would be to discover, not which is the oldest or the latest language, but whether there be such a thing as a language of nature or instinct: but in such a language it is obvious that there could be no word to denote *bread*, because in what is called the state of nature bread is unknown. The experiment of Psammetichus was probably never made; but in the woods of different countries solitary savages have at different times been caught, who, though they apparently possessed all the sagacity which is natural to man, and though their organs both of hearing and of speech were perfect, never used articulate sounds as signs of sensations or ideas. They uttered indeed the inarticulate cries which are instinctively expressive of pleasure and pain, of joy and sorrow, more distinctly and forcibly than men civilized; but with respect to the very rudiments of language, they were what Horace

represents all mankind to have been originally, *mutum et turpe pecus.* Indeed it seems to be obvious, that were there any instinctive language, the first words uttered by all children would be the same; and that every child, whether born in the desert or in society, would understand the language of every other child, however educated or however neglected. Nay more, we may venture to affirm, that such a language, though its general use might, in society, be superseded by the prevailing dialect of art, could never be wholly lost; and that no man of one country would find it difficult, far less impossible, to communicate the knowledge of his natural and most pressing wants to the men of any other country, whether barbarous or civilized. The exercise of cultivated reason, and the arts of civil life, have indeed eradicated many of our original instincts, but they have not eradicated them all (See INSTINCT). There are external indications of the internal feelings and desires, which appear in the most polished society, and which are confessedly instinctive. The passions, emotions, sensations, and appetites, are naturally expressed in the countenance by characters which the savage and the courtier can read with equal readiness. The look serene, the smoothed brow, the dimpled smile, and the glistening eye, denote equanimity and good will in terms which no man mistakes. The contracted brow, the glaring eye, the sullen gloom, and the threatening air, denote rage, indignation, and defiance, as plainly and forcibly as revilings or imprecations. To teach men to disguise these instinctive indications of their temper, and

"To carry smiles and sunshine in their face,
"When discontent sits heavy at their heart,"

constitutes a great part of modern and refined education. Yet in spite of every effort of the utmost skill, and of every motive resulting from interest, the most consummate hypocrite, or the most hackneyed politician, is not always able to prevent his real disposition from becoming apparent in his countenance. He may indeed, by long practice, have acquired a very great command both over his temper and over the instinctive signs of it; but at times nature will predominate over art, and a sudden and violent passion will flash in his face, so as to be visible to the eye of every beholder. If these observations be just, and we flatter ourselves with the belief that no man will call them in question, it seems to follow, that, if mankind were prompted by instinct to use articulate sounds as indications of their passions, affections, sensations, and ideas, the language of nature could never be wholly forgotten, and that it would sometimes predominate over the language of art. Groans, sighs, and some inarticulate lively sounds, are naturally expressive of pain and pleasure, and equally intelligible to all mankind. The occasional use of these no art can wholly banish; and if there were articulate sounds naturally expressive of the same feelings, it is not conceivable that art or education could banish the use of them, merely because by the organs of the mouth they are broken into parts and resolvable into syllables.

It being thus evident that there is no instinctive articulated language, it has become an inquiry of some importance, how mankind were first induced to fabricate articulate sounds, and to employ them for the purpose of communicating their thoughts. Children learn to speak by insensible imitation; and when advanced some years in life, they study foreign languages under proper instructors: but the first men had no speakers to imitate, and no formed language to study; by what means then did they learn to speak? On this question only two opinions can possibly be formed. Either language must have been originally revealed from heaven, or it must be the fruit of human industry. The greater part of Jews and Christians, and even some of the wisest pagans, have embraced the former opinion; which seems to be supported by the authority of Moses, who represents the Supreme Being as teaching our first parents the names of animals. The latter opinion is held by Diodorus Siculus, Lucretius, Horace, and many other Greek and Roman writers, who consider language as one of the arts invented by man. The first men, say they, lived for some time in woods and caves, after the manner of beasts, uttering only confused and indistinct noises; till, associating for mutual assistance, they came by degrees to use articulate sounds, mutually agreed upon for the arbitrary signs or marks of those ideas in the mind of the speaker which he wanted to communicate to the hearer. This opinion sprung from the atomic cosmogony which was framed by Mochus the Phenician, and afterwards improved by Democritus and Epicurus; and though it is part of a system in which the first men are represented as having grown out of the earth like trees and other vegetables, it has been adopted by several modern writers of high rank in the republic of letters, and is certainly in itself worthy of examination.

The most learned, and on every account the most respectable author who now supports this opinion, candidly acknowledges, that if language were invented, it was of very difficult invention, and far beyond the reach of the grossest savages. Accordingly he holds, that though men were originally solitary animals, and had no natural propensity to the social life; yet before language could be invented, they must have been associated for ages, and have carried on of concert some common work. Nay, he is decidedly of opinion, that before the invention of an art so difficult as language, men must not only have herded together, but have also formed some kind of civil polity, have existed in that political state a very long time, and have acquired such powers of abstraction as to be able to form general ideas. But it is obvious, that men could not have instituted civil polity, or have carried on of concert any common work, without communicating their designs to each other: and there are four ways by which the author thinks that this could have been done before the invention of speech, viz. 1. Inarticulate cries, expressive of sentiments and passions: 2. gestures, and the expression of countenance: 3. imitative sounds expressive of audible things; and, 4. painting, by which visible objects may be represented. Of these four ways of communication, it is plain that only two have any connection with language, viz. inarticulate cries and imitative sounds; and of these the author abandons the latter, as having contributed nothing to the invention of articulation, though he thinks it may have helped to advance its progress. "I am disposed," says he, "to believe, that the framing of words with an analogy to the sound of the things expressed by them, belongs rather to languages of art than to the first languages spoken by rude and barbarous

nations." It is therefore inarticulate cries only that must have given rise to the formation of language. Such cries are used by all animals who have any use of voice to express their wants; and the fact is, that all barbarous nations have cries expressing different things, such as joy, grief, terror, surprise, and the like. These, together with gestures and expression of the countenance, were undoubtedly the methods of communication first used by men: and we have but to suppose," says our author, "a great number of our species carrying on some common business, and conversing together by signs and cries, and we have men just in a state proper for the invention of language. For if we suppose their numbers to increase, their wants would increase also; and then these two methods of communication would become too confined for that larger sphere of life which their wants would make necessary. The only thing then that remained to be done, was to give a greater variety to the instinctive cries; and as the natural progress is from what is easy to what is more difficult, the first variation would be merely by tones from low to high, and from grave to acute. But this variety could not answer all the purposes of speech in society; and being advanced so far, it was natural that an animal so sagacious as man should go on farther, and come at last to the only other variation remaining, namely, articulation. The first articulation would be very simple, the voice being broken and distinguished only by a few vowels and consonants. And as all natural cries are from the throat and larynx, with little or no operation of the organs of the mouth, it is natural to suppose, that the first languages were for the greater part spoken from the throat; that what consonants were used to vary the cries, were mostly guttural; and that the organs of the mouth would at first be very little employed. From this account of the origin of language it appears, that the first sounds articulated were the natural cries by which men signified their wants and desires to one another, such as calling one another for certain purposes, and other such things as were most necessary for carrying on any joint work: then in process of time other cries would be articulated, to signify, that such and such actions had been performed or were performing, or that such and such events had happened relative to the common business. Then names would be invented of such objects as they were conversant with; but as we cannot suppose savages to be deep in abstraction, or skilful in the art of arranging things according to their genera and species, all things, however similar, except perhaps the individuals of the lowest species, would be expressed by different words not related to each other either by derivation or composition. Thus would language grow by degrees; and, as it grew, it would be more and more broken and articulated by consonants: but still the words would retain a great deal of their original nature of animal cries. And thus things would go on, words unrelated still multiplying, till at last the language would become too cumbersome for use; and then art would be obliged to interpose, and form a language upon a few radical words, according to the rules and method of etymology.

Warburton, Delaney, Johnson, Beattie, Blair, Dr. Stanhope Smith of New Jersey, and others, who think that language was originally revealed from heaven, consider this account of its human invention as a series of mere suppositions hanging loosely together, and the whole suspended from no fixed principle. The opinions of Diodorus, Vitruvius, Horace, Lucretius, and Cicero, which are frequently quoted in its support, are in their estimation of no greater authority than the opinions of other men; for as language was formed and brought to a great degree of perfection long before the era of any historian with whom we are acquainted, the antiquity af the Greek and Roman writers, who are comparatively of yesterday, gives them no advantage in this inquiry over the philosophers of France and England. Aristotle has defined man to be ζωον μιμητικον: and the definition is certainly so far just, that man is much more remarkable for imitation than invention; and therefore, say the reasoners on this side of the question, had the human race been originally mutum et turpe pecus, they would have continued so to the end of time, unless they had been taught to speak by some superior intelligence. That the first men sprung from the earth, like vegetables, no modern philosopher has ventured to assert; nor does there any where appear sufficient evidence that men were originally in the state of savages. The oldest book extant contains the only rational cosmogony known to the ancient nations; and that book represents the first human inhabitants of this earth, not only as reasoning and speaking animals, but also as in a state of high perfection and happiness, of which they were deprived for disobedience to their Creator. Moses, setting aside his claim to inspiration, deserves, from the consistence of his narrative, at least as much credit as Mochus, or Democritus, or Epicurus: and from his prior antiquity, if antiquity could on this subject have any weight, he would deserve more, as having lived nearer to the period of which they all write. But the question respecting the origin of language may be decided without resting in authority of any kind, merely by considering the nature of speech, and the mental and corporeal powers of man. Those who maintain it to be of human invention, suppose men at first to have been solitary animals, afterwards to have herded together without government or subordination, then to have formed political societies, and by their own exertions to have advanced from the grossest ignorance to the refinements of science. But, say the reasoners whose cause we are now pleading, this is a supposition contrary to all history and all experience. There is not upon record a single instance, well authenticated, of a people emerging by their own efforts from barbarism to civilization. There have, indeed, been many nations raised from the state of savages; but it is known that they were polished, not by their own repeated exertions, but by the influence of individuals or colonies from nations more enlightened than themselves. The original savages of Greece were tamed by the Pelasgi, a foreign tribe; and were afterwards further polished by Orpheus, Cecrops, Cadmus, &c. who derived their knowledge from Egypt and the East. The ancient Romans, a ferocious and motley crew, received the blessings of law and religion from a succession of foreign kings; and the conquests of Rome at a later period contributed to civilize the rest of Europe. In America, the only two nations which at the invasion of the Spaniards could be said to have advanced a single step from barbarism, were indebted for their superiority over

the other tribes, not to the gradual and unassisted progress of the human mind, but to the wise institutions of foreign legislators.

This is not the proper place for tracing the progress of man from the savage state to that of political society; but experience teaches us, that in every art it is much easier to improve than to invent. The human mind, when put into the proper track, is indeed capable of making great advances in arts and sciences; but if any credit be due to the records of history, it has not, in a people sunk in ignorance and barbarity, sufficient vigour to discover that tract, or to conceive a state different from the present. If the rudest inhabitants of America and other countries have continued, as there is every reason to believe they have continued, for ages in the same unvaried state of barbarism; how is it imaginable that people so much ruder than they, as to be ignorant of all language, should think of inventing an art so difficult as that of speech, or even to frame a conception of the thing? In building, fishing, hunting, navigating, &c. they might imitate the instinctive arts of other animals; but there is no other animal that expresses its sensations and affections by arbitrary articulate sounds. It is said, that before language could be invented, mankind must have existed for ages in large political societies, and have carried on of concert some common work: but if inarticulate cries, and the natural visible signs of the passions and affections, were modes of communication sufficiently accurate to keep a large society together for ages, and to direct its members in the execution of some common work, what could be their inducement to the invention of an art so useless and difficult as that of language? Let us however suppose, say the advocates for the cause which we are now supporting, that different nations of savages set about inventing an art of communicating their thoughts, which experience had taught them was not absolutely necessary: how came they all, without exception, to think of the one art of articulating the voice for this purpose? Inarticulate cries, out of which language is fabricated, have indeed an instinctive connection with our passions and affections; but there are gestures and expressions of countenance with which our passions and affections are in the same manner connected. If the natural cries of passion could be so modified and enlarged as to be capable of communicating to the hearer every idea in the mind of the speaker, it is certain that the natural gestures could be so modified as to answer the very same purpose (see PANTOMIME); and it is strange that among the several nations who invented languages, not one should have stumbled upon fabricating visible signs of their ideas, but that all should have agreed to denote them by articulated sounds. Every nation whose language is narrow and rude, supplies its defects by violent gesticulation; and therefore, as much less genius is exerted in the improvement of any art than was requisite for its first invention, it is natural to suppose, that, had men been left to devise for themselves a method of communicating their thoughts, they would not have attempted any other than that by which they now improve the language transmitted by their fathers. It is vain to urge that articulate sounds are fitter for the purpose of communicating thought than visible gesticulation: for though this may be true, it is a truth which could hardly occur to savages, who had never experienced the fitness of either; and if, to counterbalance the superior fitness of articulation, its extreme difficulty be taken into view, it must appear little less than miraculous that every savage tribe should think of it rather than the easier method of artificial gesticulation. Savages, it is well known, are remarkable for their indolence, and for always preferring ease to utility; but their modes of life give such a pliancy to their bodies, that they could, with very little trouble, bend their limbs and members into any positions agreed upon as the signs of ideas. This is so far from being the case with respect to the organs of articulation, that it is with extreme difficulty, if at all, that a man advanced in life can be taught to articulate any sound which he has not been accustomed to hear. No foreigner who comes to England after the age of thirty, ever pronounces the language tolerably well; an Englishman of that age can hardly be taught to utter the guttural sound which a Scotchman gives to the Greek χ, or even the French sound of the vowel *u*: and of the solitary savages who have been caught in different forests, we know not that there has been one who, after the age of manhood, learned to articulate any language so as to make himself readily understood. The present age has indeed furnished many instances of deaf persons being taught to speak intelligibly by skilful masters moulding the organs of the mouth into the positions proper for articulating the voice: but who was to perform this task among the inventors of language, when all mankind were equally ignorant of the means by which articulation is effected? In a word, daily experience informs us, that men who have not learned to articulate in their childhood, never afterwards acquire the faculty of speech but by such helps as savages cannot obtain; and therefore, if speech was invented at all, it must have been either by children who were incapable of invention, or by men who were incapable of speech. A thousand, nay a million of children could not think of inventing a language. While the organs are pliable, there is not understanding enough to frame the conception of a language; and by the time that there is understanding, the organs are become too stiff for the task. And therefore, say the advocates for the divine origin of language, reason as well as history intimates, that mankind in all ages must have been speaking animals; the young having constantly acquired this art by imitating those who were elder; and we may warrantably conclude, that our first parents received it by immediate inspiration.

To this account of the origin of language an objection readily offers itself. If the first language were communicated by inspiration, it must have been perfect, and held in reverence by those who spake it, i. e. by all mankind. But a vast variety of languages have prevailed in the world; and some of these which remain are known to be very imperfect, whilst there is reason to believe that many others are lost. If different languages were originally invented by different nations, all this would naturally follow from the mixture of these nations; but what could induce men possessed of one perfect language of divine original, to forsake it for barbarous jargons of their own invention, and in every respect inferior to that with which their forefathers or themselves had been inspired?

In answer to this objection, it is said, that ne-

thing was given by inspiration but the faculty of speech and the elements of language; for when once men had language, it is easy to conceive how they might have modified it by their natural powers, as thousands can improve what they could not invent. The first language, if given by inspiration, must in its principles have had all the perfection of which language is susceptible; but from the nature of things it could not possibly be very copious. The words of language are either proper names or the signs of ideas and relations; but it cannot be supposed that the All-wise Instructor would load the memories of men with words to denote things then unknown, or with the signs of ideas which they had not then acquired. It was sufficient that a foundation was laid of such a nature as would support the largest superstructure which they might ever after have occasion to raise upon it, and that they were taught the method of building by composition and derivation. This would long preserve the language radically the same, though it could not prevent the introduction of different dialects in the different countries over which men spread themselves. In whatever region we suppose the human race to have been originally placed, the increase of their numbers would in process of time either disperse them into different nations, or extend the one nation to a vast distance on all sides from what we may call the seat of government. In either case they would every where meet with new objects, which would occasion the invention of new names; and as the difference of climate, and other natural causes, would compel those who removed eastward or northward to adopt modes of life in many respects different from the modes of those who travelled towards the west or the south, a vast number of words would in one country be fabricated to denote complex conceptions, which must necessarily be unintelligible to the body of the people inhabiting countries where those conceptions had never been formed. Thus would various dialects be unavoidably introduced into the original language, even whilst all mankind remained in one society and under one government. But after separate and independent societies were formed, these variations would become more numerous, and the several dialects would deviate farther and farther from each other, as well as from the idiom and genius of the parent tongue, in proportion to the distance of the tribes by whom they were spoken. If we suppose a few people either to have been banished together from the society of their brethren, or to have wandered of their own accord to a distance, from which through tractless forests they could not return (and such emigrations have often taken place), it is easy to see how the most copious language must in their mouths have soon become narrow, and how the offspring of inspiration must have in time become so deformed as hardly to retain a feature of the ancestor whence it originally sprung. Men do not long retain a practical skill in those arts which they never exercise; and there are abundance of facts to prove, that a single man cast upon a desert island, and having to provide the necessaries of life by his own ingenuity, would soon lose the art of speaking with fluency his mother-tongue. A small number of men cast away together, would indeed retain that art somewhat longer; but in a space of time not very long, it would in a great measure be lost by them or their posterity. In this state of banishment, as their time would be almost wholly occupied in hunting, fishing, and other means within their reach to support a wretched existence, they would have very little leisure, and perhaps less desire, to preserve by conversation the remembrance of that ease and those comforts of which they now found themselves for ever deprived; and they would, of course, soon forget all the words which in their native language had been used to denote the accommodations and elegancies of polished life. This at least seems to be certain, that they would not attempt to teach their children a part of language which in their circumstances could be of no use to them, and of which it would be impossible to make them comprehend the meaning; for where there are no ideas, the signs of ideas cannot be made intelligible. From such colonies as this dispersed over the earth, it is probable that all those nations of savages have arisen, which have induced so many philosophers to imagine, that the state of the savage was the original state of man; and if so, we see that from the language of inspiration must have unavoidably sprung a number of different dialects, all extremely rude and narrow, and retaining nothing of the parent tongue, except perhaps the names of the most conspicuous objects of nature, and of those wants and enjoyments which are inseparable from humanity. The savage state has no artificial wants, and furnishes few ideas that require terms to express them. The habits of solitude and silence incline a savage rarely to speak; and when he speaks, he uses the same terms to denote different ideas. Speech, therefore, in this rude condition of men, must be extremely narrow and extremely various. Every new region, and every new climate, suggests different ideas, and creates different wants, which must be expressed either by terms entirely new, or by old terms used with a new signification. Hence must originate great diversity, even in the first elements of speech, among all savage nations, the words retained of the original language being used in various senses, and pronounced, as we may believe, with various accents. When any of those savage tribes emerged from their barbarism, whether by their own efforts or by the aid of people more enlightened than themselves, it is obvious that the improvement and copiousness of their language would keep pace with their own progress in knowledge and in the arts of civil life; but in the infinite multitude of words which civilization and refinement add to language, it would be little less than miraculous were any two nations to agree upon the same sounds to represent the same ideas. Superior refinement, indeed, may induce imitation, conquests may impose a language, and extension of empires may melt down different nations and different dialects into one mass; but independent tribes naturally give rise to diversity of tongues, nor does it seem possible that they should retain more of the original language than the words expressive of those objects with which all men are at all times equally concerned.

The variety of tongues, therefore, the copiousness of some, and the narrowness of others, furnish no good objection to the divine origin of language in general; for whether language was at first revealed from heaven, or in a course of ages invented by men, a multitude of dialects would inevitably arise as soon as the human race was separated into a number of distinct and independent nations. We pretend not to decide

for our readers in a question of this nature: we have given the best arguments on both sides which we could either devise or find in the writings of others: and if it be seen, as we doubt not it will, that our own judgment leans to the side of revelation, let it not be hastily condemned by those whose knowledge of languages extends no farther than to Greece and Rome, and France and England; for if they will carry their philological inquiries to the east, they may perhaps be able to trace the remains of one original language through a great part of the globe at this day.

The late learned Gilbert Wakefield, in his *Essay on the Origin of Alphabetical Characters*, first published in the Memoirs of the Manchester Philosophical Society, argues very ingeniously in favour of the opinion that alphabetical characters were not of human invention, but communicated to man from God himself. We have not room to republish the whole of his ingenious essay, but cannot forbear making a few quotations:

I. "The five first books of the Old Testament are, I believe, acknowledged by all to be, not only the most ancient compositions, but also the most early specimens of alphabetical writing at present existing in the world. Now, taking for granted the authenticity of the Mosaic records, if alphabetical writing be indeed the result of human ingenuity, one great peculiarity distinguishes it from all other *human inventions* whatsoever: the very first effort brought it to perfection."

Mr. Wakefield controverts the objection that there *may* have been alphabetical characters prior to the time of Moses, although no traces of them have reached us. There is, however, one obvious reply which Mr. Wakefield does not make. Had there been alphabetical characters prior to the time of Moses, there would have been *writings*, most probably epistolary ones: now Moses often speaks of messages and presents, and tokens of affection, and other things equally minute, but never of sending letters.

II. Says Mr. W. "If alphabetical writing were a human invention, the natural result of ingenuity and experience, might we not expect that different nations would have fallen upon the same expedient, independently of each other?" This he shews was not the case, by a fair induction of particulars, and by tracing the progress and mutation of the characters from the Hebrew, through the Chaldee, Syriac, Arabic, Æthiopic, Persic, &c. to the Greek, and thence to the Latin language. We cannot follow him at length, but shall extract a quotation from Herodotus, by which he strengthens his reasoning:

"Those Phœnicians that came with Cadmus introduced many improvements among the Greeks, and alphabetical writing too, not known, in my opinion, to the Greeks before that period. At first they used the Phœnician character; but in process of time, as the pronunciation altered, the standard of the letters was also changed. The Ionian Greeks inhabited at that time the parts adjacent to the Phœnicians; who, having received the art of alphabetical writing from these Phœnicians, used it with an alteration of some few characters: and confessed ingenuously, that it was called Phœnician from the introducers of it. And I have seen myself the characters of Cadmus in the temple of Ismenian Apollo, at Thebes in Bœotia, engraven upon tripods, and very much resembling the Ionian characters."

III. Says Mr. W. "What we know of those nations, who have continued for many centuries unconnected with the rest of the world, strangely militates against the hypothesis of the human invention of alphabetical writing." This is instanced in the case of the Chinese, the Mexicans, and the Egyptians. "Now, what will our adversaries reply to this? They will pertinaciously maintain, that alphabetical writing is a human invention: and yet all those nations who have been conversant with this expedient, are discovered to have derived it from the same original, from some *one* people in the east, whose time and means of attaining it we cannot now certainly find out; but are compelled to conclude from analogy, and the experience of other nations, that their imagination, as it was not more fertile, was not more successful than that of their neighbours.

"Again: where large communities have flourished for ages, but unconnected with those countries which enjoyed this advantage, their own solitary exertions were never capable of effecting this capital discovery. Is it possible for presumptive evidence to be more satisfactory than this?"

Mr. Wakefield's essay is concluded with the following remarks:

"1. Pliny asserts the use of letters to have been eternal. This shews the antiquity of the practice to extend beyond the era of authentic history.

"2. The cabalistical doctors of the Jews maintain, that alphabetical writing was one of the ten things which God created in the evening of the sabbath.

"3. Most of the profane authors of antiquity ascribe the first use of alphabetical characters to the Egyptians; who, according to some, received the expedient from Mercury; and, according to others, from the god Teuth. This ascription of alphabetic characters to a divine communication, shews the sense entertained by the ancients of the difficulty of the invention. The Indian letters are in a similar manner ascribed by the Hindus to a divine origin.

"4. It is remarkable that history commonly attributes the introduction of letters to some great traveller; a concurring proof of their derivation among different nations from a common source.

"5. No mention is made of the alphabet in Homer, though it appears to have been in use among the Jews long before his time.

"6. Is there any reason to suppose from the history of the human mind, that *oral* language, which has long been perfect, beyond any memorials of our species in heathen writers, and is co-eval with man, according to the testimony of Scripture; is there any reason, I say, to suppose that even *language itself* is the effect of human ingenuity and experience.

"7. To suppose that the art of alphabetical writing is the invention of man, is almost a philosophical impossibility, when we consider that it must, in this case, have been devised in the rudest state of human intellect, while *typography*, a discovery less curious and sagacious, eluded the detection of the most refined ages of literary perfection."—*Life of G. Wakefield*, ii. 362.

Language, whatever was its origin, must be

subject to perpetual changes from its very nature, as well as from that variety of incidents which affect all sublunary things; and those changes must always correspond with the change of circumstances in the people by whom the language is spoken. When any particular set of ideas becomes prevalent among any society of men, words must be adopted to express them; and from these the language must assume its character. Hence the language of a brave and martial people is bold and nervous, although perhaps rude and uncultivated; while the languages of those nations in which luxury and effeminacy prevail, are flowing and harmonious, but devoid of force and energy of expression.

But although it may be considered as a general rule, that the language of any people is a very exact index of the state of their minds, yet it admits of some particular exceptions. For as man is naturally an imitative animal, and in matters of this kind never has recourse to invention but through necessity, colonies planted by any nation, at whatever distance from the mother-country, always retain the same general sounds and idiom of language with those from whom they are separated. In process of time, however, the colonists and the people of the mother country, by living under different climates, by being engaged in different occupations, and by adopting, of course, different modes of life, may lose all knowledge of one another, assume different national characters, and form each a distinct language to themselves, totally different in genius and style, though agreeing with one another in the fundamental sounds and general idiom. If, therefore, this particular idiom, formed before their separation, happen to be more peculiarly adapted to the genius of the mother country than of the colonies, these will labour under an inconvenience on this account, which they may never be wholly able to overcome; and this inconvenience must prevent their language from ever attaining to that degree of perfection to which, by the genius of the people, it might otherwise have been carried. Thus various languages may have been formed out of one parent tongue; and thus that happy concurrence of circumstances which has raised some languages to a high degree of perfection, may be easily accounted for, while many ineffectual efforts have been made to raise other languages to the same degree of excellence.

As the knowledge of languages constitutes a great part of erudition, as their beauty and deformities furnish employment to taste, and as these depend much upon the idioms of the different tongues, we shall proceed to make a few remarks upon the advantages and defects of some of those idioms of language with which we are best acquainted:—As the words *idiom* and *genius* of a language are often confounded, it will be necessary to inform the reader, that by *idiom* we would here be understood to mean, that general mode of arranging words into sentences which prevails in any particular language; and by the *genius* of a language, we mean to express, the particular set of ideas which the words of any language, either from their formation or multiplicity, are most naturally apt to excite in the mind of any one who hears it properly uttered. Thus, although the English, French, Italian, and Spanish languages nearly agree in the same general *idiom*, yet the particular *genius* of each is remarkably different: the English is naturally bold, nervous, and strongly articulated; the French is weaker, and more flowing; the Italian more soothing and harmonious; and the Spanish more grave, sonorous, and stately. Now, when we examine the several languages which have been most esteemed in Europe, we find that there are only two *idioms* among them which are essentially distinguished from one another; and all those languages are divided between these two idioms, following sometimes the one and sometimes the other, either wholly or in part. The languages which may be said to adhere to the first *idiom*, are those which in their construction follow the order of nature; that is, express their ideas in the natural order in which they occur to the mind; the subject which occasions the action appearing first; then the action, accompanied with its several modifications; and, last of all, the object to which it has reference.—These may properly be called *analogous* languages; and of this kind are the English, French, and most of the modern languages in Europe. The languages which may be referred to the other *idiom*, are those which follow no other order in their construction than what the taste or fancy of the composer may suggest; sometimes making the object, sometimes the action, and sometimes the modification of the action, to precede or follow the other parts. The confusion which this might occasion is avoided by the particular manner of inflecting their words, by which they are made to refer to the others with which they ought to be connected, in whatever part of the sentence they occur, the mind being left at liberty to connect the several parts with one another after the whole sentence is concluded. And as the words may be here transposed at pleasure, those languages may be called *transpositive* languages. To this class we must, in an especial manner, refer the Latin and Greek languages. As each of these *idioms* has several advantages and defects peculiar to itself, we shall endeavour to point out the most considerable of them, in order to ascertain with greater precision the particular character and excellence of some of those languages now principally spoken or studied in Europe.

The partiality which our forefathers, at the revival of letters in Europe, naturally entertained for the Greek and Roman languages, made them look upon every distinguishing peculiarity belonging to them as one of the many causes of the amazing superiority which those languages evidently enjoyed above every other at that time spoken in Europe. This blind deference still continues to be paid to them, as our minds are early prepossessed with these ideas, and as we are taught in our earliest infancy to believe, that to entertain the least idea of our own language being equal to the Greek or Latin in any particular whatever, would be a certain mark of ignorance or want of taste. Their rights, therefore, like those of the church in former ages, remain still to be examined; and we, without exerting our reason to discover truth from falsehood, tamely sit down satisfied with the idea of their undoubted pre-eminence in every respect. But if we look around us for a moment, and observe the many excellent productions which are to be met with in almost every language of Europe, we must be satisfied, that even these are now possessed of some powers which might afford at least a presumption, that, if they were cultivated with a proper degree of attention, they

might, in some respects, be made to rival, if not to excel, those beautiful and justly admired remains of antiquity. Without endeavouring to derogate from their merit, let us, with the cool eye of philosophic reasoning, endeavour to bring before the sacred tribunal of Truth some of those opinions which have been most generally received upon this subject, and rest the determination of the cause on her impartial decision.

The learned reader well knows, that the several changes which take place in the arrangement of the words in every *transpositive* language, could not be admitted without occasioning great confusion, unless certain classes of words were endowed with particular variations, by means of which they might be made to refer to the other words with which they ought naturally to be connected. From this cause proceeds the necessity of several variations of verbs, nouns, and adjectives; which are not in the least essential or necessary in the *analogous* languages, as we have pretty fully explained under the article Grammar, to which we refer for satisfaction on this head.

Having thus considered language in general, we shall close these remarks with a few observations upon the particular nature and genius of those languages which are now chiefly spoken or studied in Europe.

Of all the nations whose memory history has transmitted to us, none have been so eminently distinguished for their literary accomplishments, as well as acquaintance with the polite arts, as the Greeks: nor are we as yet acquainted with a language possessed of so many advantages, with so few defects, as that which they used, and which continues still to be known by their name.—The necessary connection between the progress of knowledge and the improvement of language has been already explained; so that it will not be surprising to find their progress in the one keep pace with that of the other: but it will be of utility to point out some advantages which that distinguished people possessed, which other nations, perhaps not less distinguished for talents or taste, have not enjoyed, which have contributed to render their language the most universally admired in ancient as well as in modern times.

It has been observed, that the original inhabitants of Greece, who were gross savages, and whose language of course would be very rude and narrow, were first tamed by the Pelasgi, an eastern or an Egyptian tribe. From the east it is well known that arts and sciences were spread over the rest of the world, and that Egypt was one of the countries first civilized. The language therefore imported into Greece by the Pelasgi would be pure from the fountain head, and much more perfect in its structure than if it had been transmitted through many nations. But this was not the only circumstance highly fortunate for the Greek language. Before it had time to be fully established among the people, its asperities, which it had in common with the other dialects of the east, were polished away by such a succession of poets, musicians, philosophers, and legislators, from different countries, as never appeared in any other nation at a period so early as to give their genius and taste its full influence. In this respect, no people were ever so eminently distinguished as the ancient Greeks, who had their Orpheus, their Linus, their Cecrops, and their Cadmus, who introduced their different improvements at a time when the nation had no standard of taste formed by itself. Hence the original sounds of the Greek language are the most harmonious, and the most agreeable to the ear, of any that have hitherto been invented. They are indeed agreeable to every person who hears them, even when the meaning of the words is not understood; whereas almost all other languages, till they are understood, appear, to an ear which has not been accustomed to them, jarring and discordant. This is the fundamental excellence of that justly admired language; nor have the people failed to improve this to the utmost of their power, by many aids of their own invention. The Greek language is of the transpositive kind: but a people so lively, so acute, and so loquacious, could ill bear the ceremonious restraint to which that mode of language naturally subjected them; and have therefore, by various methods, freed it in a great measure from the stiffness which that produced. In inflecting their nouns and verbs, they sometimes prefix a syllable, and sometimes add one; which, besides the variety that it gives to the sounds of the language, adds greatly to the distinctness, and admits of a more natural arrangement of the words than in the Latin, and of consequence renders it much fitter for the easiness of private conversation: and indeed the genius of the people so far prevailed over the idiom of the language, as to render it, in the age of its greatest perfection, capable of almost as much ease, and requiring almost as little transposition of words, as those languages which have been called analogous. But as those nations who spoke this language were all governed by popular assemblies, and as no authority could be obtained among them but by a skill in rhetoric and the powers of persuasion, it became necessary for every one, who wished to acquire power or consideration in the state, to improve himself in the knowledge of that language, in the use of which alone he could expect honours or reputation. Hence it happened, that while the vivacity of the people rendered it easy, the great men studiously improved every excellence that it could reap from its powers as a transpositive language; so that, when brought to its utmost perfection by the amazing genius of the great Demosthenes, it attained a power altogether unknown to any other language.—Thus happily circumstanced, the Greek language arrived at that envied pre-eminence which it still justly retains. From the progress of arts and sciences; from the gaiety and inventive genius of the people; from the number of free states into which Greece was divided, each of which invented words of its own, all of which contributed to the general stock; and from the natural communication which took place between these states, which excited in the strongest degree the talents of the people; it acquired a copiousness unknown to any ancient language, and excelled by few of the moderns.—In point of harmony of numbers, it is altogether unrivalled; and on account of the ease as well as dignity which, from the causes above mentioned, it acquired, it admits of perfection in a greater number of particular kinds of composition than any other language known.—The irresistible force and overwhelming impetuosity of Demosthenes seems not more natural to the genius of the language, than the more flowery charms of Plato's calm and harmonious cadences, or the unadorned simplicity of Xenophon; nor does the majestic pomp of Homer seem to be more agreeable to the genius

of the language in which he wrote, than the more humble strains of Theocritus, or the laughing festivity of Anacreon. Equally adapted to all purposes, when we peruse any of these authors, we would imagine the language was most happily adapted for his particular style alone. The same powers it likewise, in a great measure, possessed for conversation; and the dialogue seems not more natural for the dignity of Sophocles or Euripides, than for the more easy tenderness of Menander, or buffoonery of Aristophanes.—With all these advantages, however, it must be acknowledged, that it did not possess that unexceptionable clearness of meaning which some analogous languages enjoy, or that characteristic force which the emphasis properly varied has power to give, were not these defects counterbalanced by other causes which we shall afterwards point out.

The Romans, a people of fierce and warlike dispositions, for many ages during the infancy of their republic, more intent on pursuing conquests and military glory than in making improvements in literature or the fine arts, bestowed little attention to their language. Of a disposition less social or more phlegmatic than the Greeks, they gave themselves no trouble about rendering their language fit for conversation; and it remained strong and nervous, but, like their ideas, was limited and confined. More disposed to command respect by the power of their arms than by the force of persuasion, they despised the more effeminate powers of speech: so that, before the Punic wars, their language was perhaps more reserved and uncourtly than any other at that time known.—But after their rival Carthage was destroyed, and they had no longer that powerful curb upon their ambition; when riches flowed in upon them by the multiplicity of their conquests; luxury began to prevail, the stern austerity of their manners to relax, and selfish ambition to take place of that disinterested love for their country so eminently conspicuous among all orders of men before that period.—Popularity began then to be courted: ambitious men, finding themselves not possessed of that merit which insured them success with the virtuous senate, amused the mob with artful and seditious harangues; and by making them believe that they were possessed of all power, and had their sacred rights encroached upon by the senate, led them about at their pleasure, and got themselves exalted to honours and riches by these insidious arts. It was then the Romans first began to perceive the use to which a command of language could be put. Ambitious men then studied it with care, to be able to accomplish their ends; while the more virtuous were obliged to acquire a skill in this, that they might be able to repel the attacks of their adversaries.—Thus it happened, that in a short time that people, from having entirely neglected, began to study their language with the greatest assiduity; and as Greece happened to be subjected to the Roman yoke about that time, and a friendly intercourse was established between these two countries, this greatly conspired to nourish in the minds of the Romans a taste for that art of which they had lately become so much enamoured. Greece had long before this period been corrupted by luxury; their taste for the fine arts had degenerated into unnecessary refinement; and all their patriotism consisted in popular harangues and unmeaning declamation. Oratory was then studied as a refined art; and all the subtilties of it were taught by rule, with as great care as the gladiators were afterwards trained up in Rome. But while they were thus idly trying who should be the lord of their own people, the nerves of government were relaxed, and they became an easy prey to every invading power. In this situation they became the subjects, under the title of the allies, of Rome, and introduced among them the same taste for haranguing which prevailed among themselves. Well acquainted as they were with the powers of their own language, they set themselves with unwearied assiduity to polish and improve that of their new masters: but with all their assiduity and pains, they never were able to make it arrive at that perfection which their own language had acquired; and in the Augustan age, when it had arrived at the summit of its glory, Cicero bitterly complains of its want of copiousness in many particulars.

But as it was the desire of all who studied this language with care, to make it capable of that stately dignity and pomp necessary for public harangues, they followed the genius of the language in this particular, and in a great measure neglected those lesser delicacies which form the pleasure of domestic enjoyment; so that, while it acquired more copiousness, more harmony, and precision, it remained stiff and inflexible for conversation: nor could the minute distinction of nice grammatical rules be ever brought down to the apprehension of the vulgar: whence the language spoken among the lower class of people remained rude and unpolished even to the end of the monarchy. The Huns who overran Italy, incapable of acquiring any knowledge of such a difficult and abstruse language, never adopted it; and the native inhabitants being made acquainted with a language more easily acquired, quickly adopted that idiom of speech introduced by their conquerors, although they still retained many of those words which the confined nature of the barbarian language made necessary to allow them to express their ideas. And thus it was that the language of Rome, that proud mistress of the world, from an original defect in its formation, although it had been carried to a perfection in other respects far superior to any northern language at that time, easily gave way to them, and in a few ages the knowledge of it was lost among mankind: while, on the contrary, the more easy nature of the Greek language has still been able to keep some slight footing in the world, although the nations in which it has been spoken have been subjected to the yoke of foreign dominion for upwards of two thousand years, and their country has been twice ravaged by barbarous nations, and more cruelly depressed than ever the Romans were.

From the view which we have already given of the Latin language, it appears evident, that its idiom was more strictly transpositive than that of any other language yet known, and was attended with all the defects to which that idiom is naturally subjected: nor could it boast of such favourable alleviating circumstances as the Greek, the prevailing sounds of the Latin being far less harmonious to the ear; and although the formation of the words is such as to admit of full and distinct sounds, and so modulated as to lay no restraint upon the voice of the speaker; yet, to a person unacquainted with the language, they do not convey that enchanting harmony so remarkable in the Greek language. The Latin is stately and

solemn; it does not excite disgust; but at the same time it does not charm the ear, so as to make it listen with delightful attention. To one acquainted with the language, indeed, the nervous boldness of the thoughts, the harmonious rounding of the periods, the full solemn swelling of the sounds, so distinguishable in the most eminent writers of that language which have been preserved to us, all conspire to make it pleasing and agreeable. In these admired works we meet with all its beauties, without perceiving any of its defects; and we naturally admire, as perfect, a language which is capable of producing such excellent works. Yet with all these seeming excellencies, this language is less copious, and more limited in its style of composition, than many modern languages; far less capable of precision and accuracy than almost any of these; and infinitely behind them all in point of easiness in conversation. But these points have been so fully proved already, as to require no further illustration. Of the compositions in that language which have been preserved to us, the Orations of Cicero are best adapted to the genius of the language, and we there see it in its utmost perfection. In the philosophical works of that great author we perceive some of its defects: and it requires all the powers of that great man to render his epistles agreeable, as these have the genius of the language to struggle with. Next to oratory, history agrees with the genius of this language; and Cæsar, in his Commentaries, has exhibited the language in its purest elegance, without the aid of pomp or foreign ornament. Among the poets, Virgil has best adapted his works to his language. The flowing harmony and pomp of it are well adapted for the epic strain, and the correct delicacy of his taste rendered him perfectly equal to the task. But Horace is the only poet whose force of genius was able to overcome the bars which the language threw in his way, and succeeded in lyric poetry. Were it not for the brilliancy of the thoughts, and acuteness of the remarks, which so eminently distinguish this author's compositions, his odes would long ere now have sunk into utter oblivion. But so conscious have all the Roman poets been of the unfitness of their language for easy dialogue, that almost none of them, after Plautus and Terence, have attempted any dramatic compositions in that language. Nor have we any reason to regret that they neglected this branch of poetry, as it is probable, if they had ever become fond of these, they would have been obliged to have adopted so many unnatural contrivances to render them agreeable, as would have prevented us (who of course would have considered ourselves as bound to follow them) from making that progress in the drama which so particularly distinguishes the productions of modern times.

The modern Italian, from an inattention too common in literary subjects, has been usually called a child of the Latin language, and is commonly believed to be the ancient Latin a little debased by the mixture of the barbarous language of those people who conquered Italy. The truth is, the case is directly the reverse: for this language, in its general idiom and fundamental principles, is evidently of the analogous kind, first introduced by those fierce invaders, although it has borrowed many of its words, and some of its modes of phraseology, from the Latin, with which they were so intimately blended that this could scarcely be avoided; and it has been from remarking this slight connection, so obvious at first sight, that superficial observers have been led to draw this general conclusion, so contrary to fact.

When Italy was overrun with the Lombards, and the empire destroyed by the northern invaders, they, as conquerors, continued to speak their own native language. Fierce and illiterate, they would not stoop to the servility of studying a language so clogged with rules, and difficult of attainment, as the Latin would naturally be to a people altogether unacquainted with nice grammatical distinctions: while the Romans of necessity were obliged to study the language of their conquerors, as well as to obtain some relief of their grievances by prayers and supplications, as to destroy that odious distinction which subsisted between the conquerors and conquered while they continued as distinct people. As the language of their new masters, although rude and confined, was natural in its order, and easy to be acquired, the Latins would soon attain a competent skill in it: and as they bore such a proportion to the whole number of people, the whole language would partake somewhat of the general sound of the former; for, in spite of all their efforts to the contrary, the organs of speech could not at once be made to acquire a perfect power of uttering any unaccustomed sounds; and as it behoved the language of the barbarians to be much less copious than the Latin, whenever they found themselves at a loss for a word, they would naturally adopt those which most readily presented themselves from their new subjects. Thus a language in time was formed, somewhat resembling the Latin both in the general tenor of the sounds and in the meaning of many words: and as the barbarians gave themselves little trouble about language, and in some cases perhaps hardly knew the general analogy of their own language, it is not surprising if their new subjects should find themselves sometimes at a loss on that account; or if, in these situations, they followed on some occasions the analogy suggested to them by their own: which accounts for the strange degree of mixture of heterogeneous grammatical analogy we meet with in the Italian as well as Spanish and French languages. The idiom of all the Gothic languages is purely analogous; and in all probability, before their mixture with the Latins and other people in their provinces, the several grammatical parts of speech followed the plain simple idea which that supposes; the verbs and nouns were all probably varied by auxiliaries, and their adjectives retained their simple unalterable state:—but by their mixture with the Latins, this simple form has been in many cases altered; their verbs became in some cases inflected; but their nouns in all these languages still retained their original form; although they have varied their adjectives, and foolishly clogged their nouns with gender, according to the Latin idioms. From this heterogeneous and fortuitous (as we may say, because injudicious) mixture of parts, results a language possessing almost all the defects of each of the languages of which it is composed, with few of the excellencies of either: for it has neither the ease and precision of the analogous, nor the pomp and boldness of the transpositive languages; at the same time that it is clogged with almost as many rules, and liable to as great abuses.

These observations are equally applicable to the French and Spanish as to the Italian language. With regard to this last in particular, we may observe, that as the natural inhabitants

of Italy before the last invasion of the barbarians, were sunk and enervated by luxury, and that by depression of mind and genius which anarchy always produces, they had become fond of feasting and entertainments, and the enjoyment of sensual pleasures constituted their highest delight; their language partook of the same debility as their body.—The barbarians, too, unaccustomed to the seductions of pleasure, soon fell from their original boldness and intrepidity, and, like Hannibal's troops of old, were enervated by the sensual gratifications in which a nation of conquerors unaccustomed to the restraint of government freely indulged. The softness of the air, the fertility of the climate, the unaccustomed flow of riches which they at once acquired, together with the voluptuous manner of their conquered subjects, all conspired to enervate their minds, and render them soft and effeminate. No wonder, then, if a language new moulded at this juncture, should partake of the genius of the people who formed it; and, instead of participating of the martial boldness and ferocity of either of their ancestors, should be softened and enfeebled by every device which an effeminate people could invent.—The strong consonants which terminated the words, and gave them life and boldness, being thought too harsh for the delicate ears of these sons of sloth, were banished their language; while sonorous vowels, which could be protracted to any length in music, were substituted in their stead.—Thus the Italian language is formed flowing and harmonious, but destitute of those nerves which constitute the strength and vigour of a language: at the same time, the sounds are neither enough diversified, nor in themselves of such an agreeable tone, as to afford great pleasure without the aid of musical notes; and the small pleasure which this affords is still lessened by the little variety of measure which the great similarity of the terminations of the words occasions. Hence it happens, that this language is fitted for excelling in fewer branches of literature than almost any other: and although we have excellent historians, and more than ordinary poets, in Italian, yet they labour under great inconveniences, from the language wanting nerves and stateliness for the former, and sufficient variety of modulation for the latter. It is, more particularly on this account, altogether unfit for an epic poem: and though attempts have been made in this way by two men whose genius, if not fettered by the language, might have been crowned with success; yet these, notwithstanding the fame that with some they may have acquired, must, in point of poetic harmony, be deemed defective by every impartial person. Nor is it possible that a language which hardly admits of poetry without rhyme, can ever be capable of producing a perfect poem of great length; and the stanza to which their poets have ever confined themselves, must always produce the most disagreeable effect in a poem where unrestrained pomp or pathos are necessary qualifications. The only species of poetry in which the Italian language can claim a superior excellence, is the tender tone of elegy: and here it remains unrivalled and alone; the plaintive melody of the sounds, and smooth flow of the language, being perfectly adapted to express that soothing melancholy which this species of poetry requires. On this account the plaintive scenes of the Pastor Fido of Guarini have justly gained to that poem an universal applause; although, unless on this account alone, it is perhaps inferior to almost every other poem of the kind which ever appeared. We must observe with surprise, that the Italians, who have fettered every other species of poetry with the severest shackles of rhyme, have in this species shewed an example of the most unrestrained freedom; the happy effects of which ought to have taught all Europe the powerful charms attending it: yet with amazement we perceive, that scarce an attempt to imitate them has been made by any poet in Europe except by Milton in his Lycidas; no dramatic poet, even in Britain, having ever adopted the unrestrained harmony of numbers to be met with in this and many other of their best dramatic compositions.

Of all the languages which sprang up from the mixture of the Latins with the northern people on the destruction of the Roman empire, none of them approach so near to the genius of the Latin as the Spanish does. For as the Spaniards have always been remarkable for their military prowess and dignity of mind, their language is naturally adapted to express ideas of that kind. Sonorous and solemn, it admits nearly of as much dignity as the Latin. For conversation, it is the most elegant and courteous language in Europe.

The humane and generous order of chivalry was first invented, and kept its footing longest, in this nation; and although it ran at last into such a ridiculous excess as deservedly made it fall into universal disrepute, yet it left such a strong tincture of romantic heroism upon the minds of all ranks of people, as made them jealous of their glory, and strongly emulous of cultivating that heroic politeness, which they considered as the highest perfection they could attain. Every man disdained to flatter, or to yield up any point of honour which he possessed; at the same time, he rigorously exacted from others all that was his due. These circumstances have given rise to a great many terms of respect and courteous condescension, without meanness of flattery, which give their dialogue a respectful politeness and elegance unknown to any other European language. This is the reason why the characters so finely drawn by Cervantes in Don Quixote are still unknown to all but those who understand the language in which he wrote. Nothing can be more unlike the gentle meekness and humane heroism of the knight, or the native simplicity, warmth of affection, and respectful loquacity of the squire, than the inconsistent follies of the one, or the impertinent forwardness and disrespectful petulance of the other, as they are exhibited in every English translation. Nor is it, as we imagine, possible to represent so much familiarity, united with such becoming condescension in the one, and unfeigned deference in the other, in any other European language, as is necessary to paint these two admirable characters.

Although this language from the solemn dignity and majestic elegance of its structure, is perhaps better qualified than any other modern one for the sublime strains of epic poetry; yet as the poets of this nation have all along imitated the Italians by a most servile subjection to rhyme; they never have produced one poem of this sort, which in point of poesy of style deserves to be transmitted to posterity. And in any other species of poetry but this, or the higher tragedy, it is not naturally fitted to excel. But although the drama and other polite branches of literature were early cultivated in this country, and made considerable progress in it, before the thirst of gain

debased their souls, or the desire of universal dominion made them forfeit that liberty which they once so much prized; since they became enervated by an overbearing pride, and their minds enslaved by superstition, all the polite arts have been neglected: so that, while other European nations have been advancing in knowledge, and improving their language, they have remained in a state of torpid inactivity: and their language has not arrived at that perfection which its nature would admit, or the acute genius of the people might have made us naturally expect.

It will perhaps by some be thought an unpardonable insult, if we do not allow the French the preference of all modern languages in many respects. But so far must we pay a deference to truth, as to be obliged to rank it among the poorest languages in Europe. Every other language has some sounds which can be uttered clearly by the voice: even the Italian, although it wants energy, still possesses distinctness of articulation. But the French is almost incapable of either of these beauties; for in that language the vowels are so much curtailed in the pronunciation, and the words run into one another in such a manner, as necessarily to produce an indistinctness which renders it incapable of measure or harmony. From this cause, it is in a great measure incapable of poetic modulation, and rhyme has been obliged to be substituted in its stead; so that this poorest of all contrivances which has ever yet been invented to distinguish poetry from prose, admitted into all the modern languages when ignorance prevailed over Europe, has still kept some footing in the greatest part of these, rather through a deference for established customs than from any necessity. Yet as the French language admits of so little poetic modulation, rhyme is in some measure necessary to it; and therefore this poor deviation from prose has been adopted by it, and dignified with the name of Poetry. But by their blind attachment to this artifice, the French have neglected to improve so much as they might have done the small powers for harmony of which their language is possessed; and by being long accustomed to this false taste, they have become fond of it to such a ridiculous excess, as to have all their tragedies, nay even their comedies, in rhyme. While the poet is obliged to enervate his language, and check the flow of composition, for the sake of linking his lines together, the judicious actor finds more difficulty in destroying the appearance of that measure, and preventing the clinking of the rhymes, than in all the rest of his task.—After this, we need not be surprised to find Voltaire attempt an epic poem in this species of poetry; although the more judicious Fenelon in his Telemaque had shown to his countrymen the only species of poesy that their language could admit of for any poem that aspired to the dignity of the epic strain.—Madam Deshouliers, in her Idyllie, has shown the utmost extent of harmony to which their language can attain in smaller poems: indeed in the tenderness of an elegy, or the gaiety of a song, it may succeed; but it is so destitute of force and energy, that it can never be able to reach the pindaric, or even perhaps the lyric strain—as the ineffectual efforts even of the harmonious Rousseau, in his translation of the Psalms of David of this stamp, may fully convince us.

With regard to its powers in other species of composition, the sententious rapidity of Voltaire, and the more nervous dignity of Rousseau, affords us no small presumption, that, in a skilful hand, it might acquire so much force, as to transmit to futurity historical facts in a style not altogether unworthy of the subject. In attempts at pathetic declamation, the superior abilities of the composer may perhaps on some occasions excite a great idea; but this is ever cramped by the genius of the language: and although no nation in Europe can boast of so many orations where this grandeur is attempted, yet perhaps there are few who cannot produce more perfect, although not more laboured compositions of this kind.

But notwithstanding, the French language labours under all these inconveniences; although it can neither equal the dignity or genuine politeness of the Spanish, the nervous boldness of the English, nor the melting softness of the Italian; although it is destitute of poetic harmony, and so much cramped in sound as to be absolutely unfit for almost every species of musical composition, yet the sprightly genius of that volatile people has been able to surmount all these difficulties, and render it the language most generally esteemed, and most universally spoken, of any in Europe; for this people, naturally gay and loquacious, and fond to excess of those superficial accomplishments which engage the attention of the fair sex, have invented such an infinity of words capable of expressing vague and unmeaning compliment, now dignified by the name of politeness, that, in this strain, one who uses the French can never be at a loss; and as it is easy to converse more, and really say less, in this than in any other language, a man of very moderate talents may distinguish himself much more by using this than any other that has ever yet been invented. On this account, it is peculiarly well adapted to that species of conversation which must ever take place in those general and promiscuous companies, where many persons of both sexes are met together for the purposes of relaxation or amusement; and must of course be naturally admitted into the courts of princes, and assemblies of great personages; who, having fewer equals with whom they can associate, are more under a necessity of conversing with strangers, in whose company the tender stimulus of friendship does not so naturally expand the heart to mutual trust or unrestrained confidence. In these circumstances, as the heart remaineth disengaged, conversation must necessarily flag; and mankind in this situation will gladly adopt that language in which they can converse most easily without being deeply interested. On these accounts the French now is, and probably will continue to be, reckoned the most polite language in Europe, and therefore the most generally studied and known: nor should we envy them this distinction, if our countrymen would not weaken and enervate their own manly language, by adopting too many of their unmeaning phrases.

The English is perhaps possessed of a greater degree of excellence, blended with a greater number of defects, than any of the languages we have hitherto mentioned. As the people of Great Britain are a bold, daring, and impetuous race of men, subject to strong passions, and, from the absolute freedom and independence which reigns amongst all ranks of people throughout this happy isle, little solicitous about controlling these passions;—our language takes its strongest characteristical distinction from the

genius of the people; and, being bold, daring, and abrupt, is admirably well adapted to express those great emotions which spring up in an intrepid mind at the prospect of interesting events. Peculiarly happy too in the full and open sound of the vowels, which forms the characteristic tone of the language, and in the strong use of the aspirate H in almost all those words which are used as exclamations, or marks of strong emotions upon interesting occasions, that particular class of words called interjections have, in our language, more of that fulness and unrestrained freedom of tones, in which their chief power consists, and are pushed forth from the inmost recesses of the soul in a more forcible and unrestrained manner, than any other language whatever. Hence it is more peculiarly adapted for the great and interesting scenes of the drama than any language that has yet appeared on the globe. Nor has any other nation ever arrived at that perfection which the English may justly claim in that respect; for however faulty our dramatic compositions may be in some of the critical niceties which relate to this art—in nervous force of diction, and in the natural expression of those great emotions which constitute its soul and energy, we claim, without dispute, an unrivalled superiority. Our language too, from the great intercourse that we have had with almost all the nations of the globe by means of our extensive commerce, and from the eminent degree of perfection which we have attained in all the arts and sciences, has acquired a copiousness beyond what any other modern language can lay claim too; and even the most partial favourers of the Greek language are forced to acknowledge, that in this respect it must give place to the English. Nor is it less happy in that facility of construction which renders it more peculiarly adapted to the genius of a free people, than any other form of language. Of an idiom purely analogous, it has deviated less from the genius of that idiom, and possesses more of the characteristic advantages attending it, than any other language that now exists: for, while others, perhaps by their more intimate connection with the Romans, have adopted some of their transpositions, and clogged their language with unnecessary fetters, we have preserved ourselves free from the contagion, and still retain the primitive simplicity of our language. Our verbs are all varied by auxiliaries (except in the instance we have already given, which is so much in our favour): our nouns remain free from the perplexing embarrassment of genders, and our pronouns mark this distinction where necessary with the most perfect accuracy; our articles also are of course freed from this unnatural encumbrance, and our adjectives preserve their natural freedom and independence. From these causes our language follows an order of construction so natural and easy, and the rules of syntax are so few and obvious, as to be within the reach of the most ordinary capacity. So that from this, and the great clearness and distinctness of meaning with which this mode of construction is necessarily accompanied, it is much better adapted for the familiar intercourse of private society, and liable to fewer errors in using it, than any other language yet known; and on this account we may boast, that in no nation of Europe do the lower class of people speak their language with so much accuracy, or have their minds so much enlightened by knowledge, as in Great Britain. What then shall we say of the discernment of those grammarians, who are every day echoing back to one another complaints of the poverty of our language, on account of the few and simple rules which it requires in syntax? As justly might we complain of an invention in mechanics, which, by means of one or two simple movements, obvious to an ordinary capacity, little liable to accidents, and easily put in order by the rudest hand, should possess the whole powers of a complex machine, which had required an infinite apparatus of wheels and contrary movements, the knowledge of which could only be acquired, or the various accidents to which it was exposed by using it be repaired, by the powers of an ingenious artist, as complain of this characteristic excellence of our language as a defect.

But if we thus enjoy in an eminent degree the advantages attending an analogous language, we likewise feel in a considerable measure the defects to which it is exposed; as the number of monosyllables with which it must always be embarrassed, notwithstanding the great improvements which have been made in our language since the revival of letters in Europe, prevents in some degree that swelling fullness of sound which so powerfully contributes to harmonious dignity and graceful cadences in literary compositions. And as the genius of the people of Britain has always been more disposed to the rougher arts of command than to the softer insinuations of persuasion, no pains have been taken to correct these natural defects of our language: but, on the contrary, by an inattention of which we have hardly a parallel in the history of any civilized nation, we meet with many instances, even within this last century, of the harmony of sound being sacrificed to that brevity so desirable in conversation, as many elegant words have been curtailed, and harmonious syllables suppressed, to substitute in their stead others, shorter, indeed, but more barbarous, and uncouth.—Nay, so little attention have our forefathers bestowed upon the harmony of sounds in our language, that one would be tempted to think, on looking back to its primitive state, that they had on some occasions studiously debased it. Our language, at its first formation, seems to have laboured under a capital defect in point of sound, as such a number of S's enter into the formation of our words, and such a number of letters and combinations of other letters assume a similar sound, as to give a general hiss through the whole tenor of our language, which must be exceedingly disagreeable to every unprejudiced ear.—We would therefore have naturally expected, that at the revival of letters, when our forefathers became acquainted with the harmonious languages of Greece and Rome, they would have acquired a more correct taste, and endeavoured, if possible, to diminish the prevalence of this disgusting sound. But so far have they been from thinking of this, that they have multiplied this letter exceedingly. The plurals of almost all our nouns were originally formed by adding the harmonious syllable *en* to the singular, which has given place to the letter *s*; and instead of housen formerly, we now say houses. In like manner, many of the variations of our verbs were formed by the syllable *eth*, which we have likewise changed into the same disagreeable letter; so that instead of loveth, moveth, writeth, walketh, &c. we have changed them into the more modish form of loves, moves, writes, walks, &c. Our very auxiliary verbs

LA'NGUOROUS. *a.* (*languoreux*, French.) Tedious; melancholy: not in use (*Spenser*).

LANHAM. See Lavenham.

LANIARD (from *lanier*, Fr.) a short piece of cord or line fastened to several machines in a ship, and serving to secure them in a particular place, or to manage them more conveniently. Such are the laniards of the gun-ports, the laniards of the gun-ports, the laniard of the buoy, the laniard of the cat-hook, &c.

LA'NIFICE. *s.* (*lanificium*, Latin.) Woollen manufacture (*Bacon*).

LANI'GEROUS. *a.* (*laniger*, Latin.) Bearing wool.

To LA'NITE. *v. a.* (*lanio*, Latin.) To tear in pieces; to rend; to lacerate.

LANIUS. Shrike. In zoology a genus of the class aves, order accipies. Bill straightish, with a tooth on each mandible near the end, naked at the base; tongue jagged at the end. The birds of this genus are generally noisy and quarrelsome; prey on smaller birds which they tear to pieces, sticking the fragments on thorns; nostrils generally round, covered with stiff bristles; toes divided to the origin, except the middle toe, which is slightly connected to the outer; tail mostly wedge-shaped, the middle rising higher than the rest, and the sides doubled down. Fifty-six species scattered over the globe, of which two only are common to our own country. We shall commence the following examples with a description of them.

1. L. Excubitor. Great Shrike. Three varieties:

α. Tail wedged; white at the sides; back hoary; wings black with a white spot.

β. Body white; legs yellowish; bill and claws blackish.

γ. Smaller wing-coverts and shoulders reddish. In all the bill and legs are black; crown and neck hoary; body beneath white with pale brown arched lines; tail white at the tip, except the two middle feathers; cheeks white with a black transverse line from the base of the bill. Inhabits woods of Europe and North America; preys on small birds which it fixes on a thorn and tears to pieces; makes it nest of dry grass and feathers; lays seven blueish eggs spotted with brown.

2. L. Collurio. Five varieties:

α. Tail somewhat wedged; back grey; four middle feathers uniform; bill lead-colour. Common to England and called *Butcher Bird*.

β. Body above variegated with reddish white and black, beneath reddish-white. Common to England, and called *Wood-chat*.

γ. Body grey, beneath reddish with brown streaks; scapulars half white, half black: three outer quill feathers white at the base and tips, the outermost reddish-white above; inhabits Europe.

δ. Base of the quill-feathers spotted with white.

ε. Head black; tail long. The two last inhabitants of Senegal. These birds are seven and a half inches long: build in bushes and hedges; lay six eggs with a circle of brown near the broad end; kill small birds by piercing the skull with its bill, and insects by transfixing them on the thorn of the sloe-tree; imitates the notes of other birds, that it may decoy them into its clutches.

3. L. Tyrannus. Tyrant Shrike. Body cinereous, beneath white; crown black, with a longitudinal tawny streak. Three other varieties from differences of colour or streaks. Inhabits America: eight inches long; builds in hollow trees; fierce audacious; fixes on the backs of eagles and hawks; and makes a continual chattering noise till they are hereby compelled to retire.

4. L. Faustus. Wreathed Shrike. Grey; beneath rusty; a white line behind the eyes; tail rounded; bill and legs pale; wings rounded; quill-feathers brownish, grey at the edges, and marked with light-brown lines, crossing each other; inhabits China, of the size of the field-fare; and is often painted on paper-hangings brought from China.

5. L. Nengota. Grey Shrike. Tail wedged, white at the tip; body cinereous, beneath whitish: irids light green; wings and tail blackish; wing-coverts black with dirty white tips; primary quill-feathers black; outer tail-feathers white at the ends. Inhabits Brasil, Surinam, Russia and Siberia, in marshy places; nine inches long, gregarious. See Nat. Hist. Pl. CXLVII.

LANK. *a.* (*lancke*, Dutch.) 1. Loose; not filled up; not stiffened out; not fat; not plump; slender (*Boyle*). 2. Faint; languid (*Milton*).

LA'NKNESS. *s.* (from *lank.*) Want of plumpness.

LANNER, in Ornithology. See Falco.

LANSQUINET, the name of a game at cards, of French origin. It may be played at by any indiscriminate number of people, though a single pack of cards is used during the deal. The dealer, who possesses an advantage, shuffles the cards, and, after they have been cut by another of the party, deals out two cards on his left hand, turning them up then one for himself, and a fourth that he places on the table for the company, which is called the *rejouissance*. On this card any, or all the company, the dealer excepted, may put their money, which the dealer is compelled to answer. The dealer continues turning the cards upwards, one by one, till two of a sort come up, that is to say, two aces, two deuces, &c. which, to prevent mistakes, or their being considered as single cards, he places on each side of his own card; and as often as two, three, or the fourth sort of a card come up, he invariably places them, as before mentioned, on each side of his own card. The company has a right to take and put money upon any single card, unless

the dealer's card should happen to be double, which is often the case, by his card being the same as one of the two hand-cards, which he first dealt out on his left hand: thus he continues dealing till he brings either their cards or his own. Whilst the dealer's own card remains undrawn, he wins; and whichever card is turned up first, loses. If he deals out the two cards on his left hand, which are styled the *hand-cards*, before his own, he is entitled to deal again. This advantage amounts to no more than his being exempted from losing, when he turns up a similar card to his own, immediately, after he has turned up one for himself.

Lansquinet is often played without the *rejouissance*, the dealer giving every one of the party a card to put their money upon. It is also often played by dealing only two cards, one for the company and the other for the dealer.

It should likewise be observed, that a limitation is generally fixed for the sum to be placed upon any card or number of cards, either in gold or silver, beyond which the dealer is not obliged to answer.

Lansquinet, is also the name sometimes given to a common foot soldier.

LANTA'NA. Indian-sage. In botany a genus of the class didynamia, order angiospermia. Calyx absolutely four-toothed; corol with the border four-cleft, and the orifice pervious; stigma bent down like a hook; drupe with a two-celled, smooth nut. Fifteen species: chiefly natives of America, a few of India and the Cape. The following are those chiefly cultivated in our own gardens.

1. L. Camara. Wild sage. Leaves opposite, decussate, ovate, pointed, serrate, hairy: stem unarmed, branched; flowers in umbelled heads; heaps leafless: colour of the flowers yellow-tinged with red, very beautiful.

2. L. Involucrata. Sea-side sage. Leaves, opposite and ternate, rhombosate, obtuse, wrinkled, downy; stem unarmed; heads bractes ovate. The leaves have an agreeable fragrance and are used as a demulcent in catarrhs, and coryzas.

3. L. Aculcata. Prickly sage. Leaves opposite, ovate, some of them cordate, rather soft underneath; stem prickly; heads hemisperic; bractes linear, wedge-form: flowers yellow, imbescent. All American plants; and capable of propagation by seeds or cuttings: the last requires a stone heap in our own country,

LANTERLOO, or Loo, a game at cards, played several ways: the two following are the most common.

The first way is this: lift for dealing, and the best put carries it: as many may play as the cards will permit; five being dealt to each, and then turning up trump. Now, if three, four, five, or six play, they may lay out the threes, fours, fives, sixes, and sevens, to the intent they may not be quickly looed: or if they would have the loos come fast about, then they are to play with the whole pack.

Having dealt, set up five scores, or chalks. Then ask every one, beginning with the eldest in hand, whether they will play, or pass from the benefit of the game; and here it is to be observed that the cards have the same values as in honours. You may play upon every card what sum you please, from a penny to a pound; and if looed, that is, win never a trick, you must lay down to the stock so much for your five cards, as you played upon every one of them. Every deal rub off a score, and for every trick you win set up a score, till the first scores are out; then counting your scores, or the numbers of the tricks you have won, you are to take from the stock in proportion to the value. A flush, or five cards of a suit, looes all the other hands, and sweeps the board; and if there be two flushes, the eldest in hand hath the advantage: the knave of clubs, called paam, has this privilege, that he makes a suit with any other other cards, and saves the person who has him from being looed.

The other way is this: the dealer lays down so much for every card as the company please to play for; and the cards being dealt, all must play; if any be looed, they must each lay down so much as the cards are valued at, for their loo; and if the person next dealing be looed, he must lay down double the said sum, *viz.* one for dealing, and the other for his loo. In case of a loo, the gamesters are asked whether they will play or not, beginning at the eldest hand; but if there is no loo they must all play as at first; and this necessity they justly call force.

If there be never a loo the money may be divided by the gamesters, according to the number of their tricks, or left till one be looed, as they shall judge proper.

LANTERN, or Lanthorn, a contrivance to carry a candle in; being a kind of cover usually made of tin, with sashes of some transparent matter, as glass, horn, &c. to transmit the light.

Lantern, *Dark*, one with only one opening, which may also be closed up when the light is to be entirely hid, or opened when there is occasion for the assistance of the light to discover some object.

Lantern, *magic*, an optic machine, whereby little painted images are represented so much magnified as to be accounted the effect of magic by the ignorant. See Optics.

The contrivance is briefly this: A B C D (Plate 93. Miscel. fig. 9.) is a tin lantern, from whose side there proceeds a square tube *b n k l m c*, consisting of two parts; the outermost of which, *n k l m*, slides over the other so as that the whole tube may be lengthened or shortened by that means. In the end of the arm, *n k l m*, is fixed a convex glass, *k l*; about *d e* there is a contrivance for admitting and placing an object, *de*, painted in dilute and transparent co-

to break the treaty between the Greeks and Trojans.

LAOMEDON, son of Ilus, king of Troy, was father to Podarces, afterwards known by the name of Priam, and Hesione. He built the walls of Troy, assisted by Apollo and Neptune. When the walls were finished Laomedon refused to reward the labours of the gods, and soon after his territories were laid waste by the sea, and his subjects were visited by a pestilence. Sacrifices were offered to the offended divinities, but nothing could appease the gods, according to the oracle, but annually to expose to a sea monster a Trojan virgin. This victim was decided by lot, and when the calamity had continued for five or six years, the lot fell upon Hesione, Laomedon's daughter. In the midst of Laomedon's fears for the fall of his daughter, Hercules came and offered to deliver the Trojans from this calamity, if Laomedon promised to reward him with a number of fine horses. The king consented, but when the monster was destroyed, he refused them. Hercules was obliged to besiege Troy, and take it by force of arms. Laomedon was put to death, after a reign of 29 years.

LAON, a town of France, in the department of Aisne, with a castle, and lately a bishop's see. Its principal trade consists in corn and wine; and it is noted for excellent artichokes. It is seated on a mountain, 77 miles N.E. of Paris. Lon. 3. 43. E. Lat. 49. 34. N.

LAOS, a kingdom of Asia, bounded on the N. by China, on the E. by Tonquin and Cochin China; on the S. by Cambodia, and on the W. by Burmah. It is full of forests, and abounds in rice and fruits. The inhabitants are well made, robust, of an olive complexion, and mild; but very superstitious, and much addicted to women. Their principal occupation is tilling the ground and fishing. The king is absolute, and has no other law than his own will: he shows himself but twice a year, and has a large revenue from elephants' teeth found in his dominions. Their religion is much the same as in China. Lanjan is the capital.

LAP. *s.* (læppe, Saxon.) 1. The loose part of a garment, which may be doubled at pleasure (*Swift*). 2. The part of the clothes that is spread horizontally over the knees as one sits down, so as any thing may lie on it (*Shakspeare*).

To LAP. *v. a.* (from the noun.) 1. To wrap or twist round any thing (*Newt.*) 2. To involve in any thing (*Swift*).

To LAP. *v. n.* To be spread or turned over any thing (*Grew*).

To LAP. *v. n.* (lappian, Saxon.) To feed by quick reciprocations of the tongue (*Digby*).

To LAP. *v. a.* To lick up (*Chapman*).

LAPA'CTCIS (from λαπαζω, to evacuate.) Purgative medicines.

LA'PATHUM, (*Lapathum, i,* n. λαπαθον; from λαπαζω, to evacuate; so named because it purges gently.) The dock.

LA'PATHUM ACETOSUM. Common sorrel. See ACETOSA.

LA'PATHUM ACUTUM. See OXYLAPATHUM.

LA'PATHUM AQUATICUM. See HYDROLAPATHUM.

LA'PDOG. *s.* (*lap* and *dog*.) A little dog, fondled by ladies in the lap (*Dryden*).

LAPEIROUSIA. In botany, a genus of the class syngenesia, order polygamia frustranea. Receptacle naked, rough, with small protuberances; downless, or a thin margin; flowers without ray. One species, a shrubby plant of the Cape, erect with terminal, solitary, sessile flowers.

LA'PFUL. *s.* (*lap* and *full*.) As much as can be contained in the lap (*Locke*).

LA'PICIDE. *s.* (*lapicida*, Latin.) A stonecutter.

LA'PIDARY, *Lapidarius*, an artificer, who cuts precious stones.

The art of cutting precious stones is very ancient; but, like other arts, its original was very imperfect. The French have succeeded in it the best; and the lapidaries of Paris, who have been a corporation since the year 1290, have carried it, especially the cutting of diamonds called brilliants, to a very great perfection, but not superior to that of the English.

There are various machines used in the cutting of precious stones, according to the quality of the matter to be cut: the diamond, which is extremely hard, is cut and formed on a wheel of soft steel, turned by a kind of mill, with diamond dust tempered in oil of olives; and this serves to polish them as well as to cut them.

Oriental rubies, sapphires, and topazes, are cut and formed on a copper wheel, with oil of olives, and diamond dust: they are afterwards polished on another copper wheel with tripoli and water.

Emeralds, hyacinths, amethysts, garnets, agats, and other stones less hard, are cut on a leaden wheel, with smalt and water, and polished on a tin wheel with tripoli.

Turquois, of the old and new rock, lapis girasol, and opal, are cut and polished on a wooden wheel with tripoli.

LA'PIDARY is also used for a virtuoso skilled in the nature, kinds, &c. of precious stones; or a merchant who deals in them.

LA'PIDARY *style*, denotes the style proper for monumental or other inscriptions.

This is a kind of medium between prose and verse; the jejune and the brilliant are here equally to be avoided. Cicero has prescribed the rules of it: *Accedat oportet oratio varia, vehemens, plena spiritus. Omnium sententiarum gravitate, omnium verborum ponderibus, est utendum.*

The lapidary style, which was lost with the ancient monuments, was retrieved, at the beginning of this age, by count Emanuel Tesoro: it is now used various ways at the beginning of books; and even

epistles dedicatory are composed in it, of which we have no example among the ancients.

To LA'PIDATE. *v. a.* (*lapido*, Lat.) To stone; to kill by stoning.

LAPIDA'TION. *s.* (*lapidatio*, Latin; *lapidation*, French.) A stoning.

LAPIDES CANCRORUM. See CANCER.

LAPI'DEOUS. *a.* (*lapideus*, Lat.) Stony; of the nature of stone (*Ray*).

LAPIDE'SCENCE. *s.* (*lapidesco*, Latin.) Stony concretion (*Brown*).

LAPIDE'SCENT. *a.* (*lapidescens*, Latin.) Growing or turning to stone.

LAPIDI'FIC. *a.* (*lapidifique*, Fr.) Forming stones (*Grew*).

LAPIDIFICA'TION. *s.* (*lapidification*, Fr.) The act of forming stones (*Bacon*).

LA'PIDIST. *s.* (from *lapidis*, Latin.) A dealer in stones or gems (*Ray*).

LAPIS, in general, is used to denote a stone of any kind.

LAPIS, in Roman antiquity, a geographical measure denoting a mile; because miles were distinguished by erecting a stone at the end of each; from the number marked on which, the length of way from Rome might be known. The device is by Plutarch ascribed to Caius Gracchus. This was more accurately executed by Augustus, who erected a gilt pillar in the Forum, at which all the public ways of Italy, distinguished by stones, were terminated. The same thing was done in the Roman provinces. Hence the phrases *tertius lapis*, *centesimus lapis*, &c. for three, a hundred, &c. miles; and sometimes the ordinal number without *lapis*, as *ad duodecimum*, &c. at 12 miles distance.

LAPIS *Assius*, in the natural history of the ancients, the name of a stone called also *sarcophagus*, from its power of consuming flesh. See SARCOPHAGUS.

LAPIS BONONIENSIS. Bononian or Bologna-Stone, in mineralogy a species of BARYTES, which see; as also BONONIAN-STONE.

LAPIS BEZOAR. See BEZOAR.

LAPIS CÆRULEUS. See LAPIS LAZULI.

LAPIS CALAMINARIS. See CALAMINE-STONE.

LAPIS CY'ANUS. See LAPIS LAZULI.

LAPIS HÆMATI'TES. See HÆMATITES.

LAPIS HIBERNICUS. *Tegula hybernica. Ardesia hibernica. Hardesia.* Irish slate. A kind of slate or very hard stone found in different parts of Ireland, in a mass of a blueish black colour, which stains the hands. When dried and powdered it is pale, or of a whitish blue, and by keeping grows black. In the fire it yields a sulphureous gaz, and acquires a pale red colour, with additional hardness. It is occasionally powdered by the common people, and taken in spruce beer, against inward bruises.

LAPIS HYSTRICIS. See BEZOAR PORCINUM.

LAPIS INFERNALIS. See KALI PURUM.

LAPIS LAZULI. *Lapis cyanus.* Azure stone. A combination of silex, the blue fluat of lime and sulphat of lime, and iron. This singular mixture forms a stone of a beautiful opake blue, which it preserves in a strong heat, and does not suffer any alteration by the contact of air. It was formerly exhibited as a purgative and vomit, and given in epilepsy. See LAZULUS.

LAPIS MALACENSIS. See BEZOAR PORCINUM.

LAPIS PORCINUS. See BEZOAR PORCINUM.

LAPIS SIMIÆ. See BEZOAR SIMIÆ.

LAPITHÆ, a people of Thessaly.

LAPITHUS, in fabulous history, a son of Apollo, by Stilbia. He was brother to Centaurus, and married Orsinome, daughter of Euronymus, by whom he had Phorbas and Periphas. The name of Lapithæ was given to the numerous children of Phorbas and Periphas. The chief of the Lapithæ assembled to celebrate the nuptials of Pirithous, one of their number. The Centaurs were invited to partake of the festivity, one of whom being intoxicated, offered violence to Hippodamia, the bride of Pirithous. A general quarrel ensued, in which many of the Centaurs were slain, and they at last were obliged to retire. Theseus among the Lapithæ, shewed himself brave and intrepid in supporting the cause of his friends, and Nestor also was not less active in the protection of chastity and innocence. The invention of bits and bridles for horses is attributed to the Lapithæ.

LAPLAND, a country of Europe, bounded on the N. by the North Sea and the Frozen Ocean, on the E. by the White Sea, on the S. by Sweden and the gulf of Bothnia, and on the W. by Norway. It is situate between 69 and 75. of N. lat. comprehending, on the most northern side of it, the frozen Alps, or Alps of Snow. These Alps compose the summit of that chain of mountains called Severnoi, whose declivity toward the E. and S. consists of lower mountains, deserts, forests, fens, and lakes. Swedish Lapland occupies the S. division of this country, which is the largest; Russian Lapland is situate in the E. part: and Danish Lapland, which is the smallest, extends the whole length of the Severnoi, on their northern side. The Laplanders are of a middling stature; stout, straight, and of a yellowish complexion, occasioned by the weather, the smoke of their habitations, and their habitual filthiness. They have generally a flattish face, fallen cheeks, dark gray eyes, thin beard, and brown hair. Their manner of life renders them hardy, agile, and supple, but, at the same time, much inclined to laziness. They are peaceable, obedient to their superiors, cheerful in company, but mistrustful, cheats in commerce, and so proud of their country and constitution, that, when removed from the place of their nativity, they usually die of the nostalgia,

or longing to return. Their women are short, often well made, complaisant, chaste, and of weak nerves; which is also observable sometimes among the men. The language of the Laplanders comprehends so many dialects, that it is with difficulty they understand each other. The men are divided into Fishers and Mountaineers. The former make their habitations in the neighhood of some lake, whence they draw their subsistence. The others seek their support upon the mountains, possessing herds of raindeer, which they use according to the season; but they go generally on foot. They are very industrious herdsmen, and are rich in comparison of the fishers. Some of them possess six hundred or a thousand raindeer; and they castrate the superfluous males by crushing the testacles with their teeth. The Lapland fishers, who are also called Laplanders of the woods (because in summer they dwell upon the borders of the lakes, and in winter in the forests) live by fishing and hunting, and choose their situation from its convenience for either. Beside looking after their raindeer, the fishery, and the chace, the men employ themselves in the construction of their canoes, which are little, light, and compact. They also make sledges, to which they give the form of a canoe; harness for the raindeer; all sorts of utensils in wood, such as cups, bowls, &c. which are sometimes prettily carved, sometimes ornamented with bones, brass, or horn: it is the man's business, likewise, to look after the kitchen. The employment of the women consists in making nets for the fishery, drying fish and meat, milking the raindeer, making cheese, and tanning hides. They prepare the nerves of the raindeer in such a manner as to make them serve for thread; and draw brass wire by the help of the horns of the raindeer pierced, instead of a drawing iron. They embroider their clothes with brass wire, silver, sham gold, or wool, which they have the art of dying in all sorts of colours. These people live in huts in the form of tents, covered with briars, bark, linen, turf, coarse cloth, felt, or raindeer-skins; and the door is of felt, made like two curtains, which open asunder. They are not able to stand upright in these huts, but constantly sit upon their heels round the fire. At night they lie down quite naked; and, to separate the apartments, place upright sticks at small distances. They cover themselves with their clothes, and in winter put their feet into a fur bag. Their household furniture consists of iron or copper kettles, wooden cups, bowls, spoons, and sometimes tin, or even silver basins: to these may be added their implements of fishing and hunting. That they may not be obliged to carry such a number of things with them in their excursions, they build, at certain distances, in the forests, little huts made like pigeon-houses, and placed upon the trunk of a tree cut off at about the height of six feet from the root. In these elevated huts they keep their goods and provisions; and though they are never shut, yet are they never plundered. In their dress they use no linen. The men wear close breeches, reaching down to their shoes, which are made of untanned skin, pointed, and turned up before; and, in winter, they put a little hay in them. Their doublet is made to fit their shape, and open at the breast; over this they wear a close coat, the skirts of which reach down to the knees, and it is fastened round them by a leathern girdle, ornamented with plates of tin or brass. To this girdle they tie their knives, their instruments for getting fire, and their smoking apparatus. Their clothes are made of fur, leather, or cloth; always bordered with fur, or cloth of different colours. Their caps are edged with fur, pointed at top, and the four seams adorned with lists of a different colour. The Russian Laplanders generally border their caps with rat-skins. The women wear breeches, shoes, doublets, and close coats, like the men; but their girdle is commonly embroidered with brass wire. Beside these, they wear kerchiefs, and little aprons, made of Russian painted cloth, rings on their fingers, and ear-rings, to which they sometimes hang chains of silver, which pass two or three times round the neck. They sometimes wear caps folded after the manner of turbans; and sometimes caps to the shape of the head; but all are ornamented with the embroidery of brass wire, or with list of different colours. The raindeer supply the Laplanders with the greatest part of their provisions; the chase and the fishery furnish the rest; but the flesh of the bear is their most delicate meat. Their common drink is water, sometimes mixed with milk: brandy is scarce with them; but they are very fond of it. Their most considerable traffic is with the Norwegians, and the balance is always in favour of the Laplanders; because they can furnish more skins and furs than they buy flour, cloth, and hardware goods. All the money, which they have not immediate occasion for, they bury in the earth, as well as their plate, and whatever they think of value. Nor even at the point of death do they declare the spot where it is hidden, imagining that they shall want it in the other world. Sterility is a reproach among the women. They are generally delivered without difficulty; the husband assists at the labour, and affords his wife the necessary help. Their cradle is small, light, and made in the shape of a canoe; and, in their journies, the women carry it at their backs. Their weddings are kept at the bride's house, who appears with her head quite uncovered, which, at other times, is never the custom with either women or maidens: the feast is a kind of

club-mess, to which each of the guests brings meat and drink. Their diversion, at weddings and other merry-makings, is the game of fox and geese: they wrestle and jump over a stick; and are fond of giving grotesque accounts of different adventures. They likewise dance and sing, or rather howl in disagreeable measures. All the Swedish and Norwegians, as well as the greatest number of the Russian Laplanders, bear the name of Christians; but their religion is a compound of Christian and pagan ceremonies.

LAPLISIA. Sea-hare. In helminthology, a genus of the order mollusca. Body creeping covered with reflected membranes, with a membranaceous shield on the back covering the lungs; aperture placed on the right side; vent above the extremity of the back; feelers four, resembling ears. Two species.

1. L. Depilans. Body pale lead colour, immaculate; apparently a mishapen mass, enveloped in a loose skin which folds over and nearly meets on the back; shield nearly in the middle of the back and circular; the two fore-feelers thick and placed forwards, the hind ones at a little distance backwards, behind which are the eyes. Inhabits European seas; from two to five inches long; is extremely nauseous and fetid; and is said to occasion the hair to fall off the hands of those who touch it; whence its specific name.

2. L. Fasciata. Black: the edges of the membranaceous covering and of the feelers scarlet. Inhabits the shores of Barbary among rocks; when touched discharges a black and red sanies, but not fetid or dipilatory like the last.

LAPPA Major. See Barbada.

LAPPAGO, in botany, a genus of the class triandria, order digynia. Calyx about three-valved; corol two valved, reversed. One species; a three or four-flowered grass of the South of Europe.

LA'PPER. *s.* (from *lap.*) 1. One who wraps up (*Swift*). 2. One who laps or licks.

LA'PPET. *s.* (diminutive of *lap.*) The part of a headdress that hangs loose (*Swift*).

LAPSANA. Nipplewort: dog-cress. In botany, a genus of the class syngenesia, order polygamia equalis. Receptacle naked; calyx invested with scales; the inner leaflets equal and channelled; downless. Five species, four European plants, one a native of Barbary: of the former the two following are common to our own country.

1. L. minima. Stemless; three or four flowered; peduncles hollow, thickened at the top; leaves obovate; oblong, toothed. Found in our dry fields.

2. L. communis. Caulescent; branched; leaves ovate, petioled, with angular teeth. Found in our wastes; and formerly employed in medicine as a lactescent bitter, and as possessing the same virtues as cichory, endive, dandelion.

LAPSE. *s.* (*lapsus*, Latin.) 1. Flow; fall; glide; smooth course (*Hale*). 2. Petty errour; small mistake (*Rogers*). 3. Transition of right from one to another.

To LAPSE. *v. n.* (from the noun.) 1. To glide slowly: to fall by degrees (*Swift*). 2. To fail in any thing; to slip (*Shakspeare*). 3. To slip, as by inadvertency or mistake (*Addison*). 4. To lose the proper time (*Ayliffe*). 5. To fall by the negligence of one proprietor or another (*Ayliffe*). 6. To fall from perfection, truth, or faith (*Stillingfleet*).

LAPSE, in law, the omission of a patron to present to a church, within six months after voidable; by which neglect title is given to the ordinary to collate to such church: and in such case, the patronage devolves from the patron to the bishop, from the bishop to the archbishop, and from the archbishop to the king. A donative does not go in lapse; but the ordinary may compel the patron by ecclesiastical censures to fill up the vacancy. But if the donative has been augmented by the governors of queen Anne's bounty, it will lapse in like manner as presentative livings.

LAPSED Legacy, is where the legatee dies before the testator; or where a legacy is given upon a future contingency, and the legatee dies before the contingency happens. As if a legacy is given to a person when he attains the age of 21 years, and the legatee dies before that age; in this case the legacy is a lost or lapsed legacy, and shall sink into the residuum of the personal estate. 2 Black. 613.

LAPWING, in Ornithology. See Tringa.

LA'PWORK. *s.* (*lap* and *work.*) Work in which one part is interchangeably wrapped over the other (*Grew*).

LAQUEARIUS, a kind of athleta among the ancients, who in one hand held the laqueus, i. e. a sort of snare, wherewith to embarrass and entangle his antagonist, and in the other a poignard to stab him.

LARA or LARANDA, one of the Naiades, daughter of the river Almon in Latium, famous for her beauty and her loquacity. She revealed to Juno the amours of her husband Jupiter with Juturna, for which the god cut out her tongue, and ordered Mercury to conduct her to the infernal regions. The messenger fell in love with her by the way, and gratified his passion. Lara became mother of two children, to whom the Romans have paid divine honours, according to the opinion of some, under the name of Lares. *Ovid.*

LAR, a town of Persia, in the province of Fars, with a castle. It carries on a great trade in silk; and its territory abounds in oranges, lemons, and very large tamarinds. E. lon. 54. 15. N. lat. 27. 30.

LARACHA, an ancient and strong town

of Africa, in the kingdom of Fez. It is seated at the mouth of a river of the same name, with a good harbour. It was once in possession of the Spaniards; but the Moors took it from them. W. lon. 5. 55. N. lat. 35. 0.

LARARIUM, was a chapel which the Romans frequently had in their houses for the household gods, called lares.—Spartian says, that Alexander the son of Mammeus kept in his lararium the figure of our Saviour, together with his other idols.

LAR-BOARD, among seamen, the left-hand side of the ship when you stand with your face towards the head.

LARCENY, or Theft, by contraction for latrociny, latrocinium, is distinguished by the law into two sorts: the one called simple larceny or plain theft, unaccompanied with any other atrocious circumstance: and mixed or compound larceny, which also includes in it the aggravation of a taking from one's house or person.

I. Simple larceny, when it is the stealing of goods above the value of twelvepence, is called grand larceny; when of goods to that value, or under, is petit larceny: offences, which are considerably distinguished in their punishment, but not otherwise. See Theft.

II. Mixed, or compound larceny, is such as has all the properties of the former (see Theft); but is accompanied with either one or both of the aggravations of a taking from one's house or person. First therefore of larceny from the house, and then of larceny from the person.

1. Larceny from the house, though it might seem to have a higher degree of guilt than simple larceny, yet is not at all distinguished from the other at common law; unless where it is accompanied with the circumstance of breaking the house by night; and then it falls under another description, viz. that of burglary (see Burglary.) But now by several acts of parliament (the history of which is very ingeniously deduced by a learned modern writer, who hath shewn them to have gradually arisen from our improvements in trade and opulence) the benefit of clergy is taken from larcenies committed in a house in almost every instance; except that larceny of the stock or utensils of the plate glass company from any of their houses, &c. is made only single felony, and liable to transportation for seven years. The multiplicity of the general acts is apt to create some confusion; but upon comparing them diligently, we may collect, that the benefit of clergy is denied upon the following domestic aggravations of larceny; viz. first, in larcenies above the value of twelvepence committed, 1. In a church or chapel, with or without violence, or breaking the same: 2. In a booth or tent in a market or fair, in the day-time or in the night, by violence or breaking the same, the owner or some of his family being therein: 3. By robbing a dwelling-house in the day-time (which robbing implies a breaking), any person being therein: 4. In a dwelling-house by day or by night, without breaking the same, any person being therein and put in fear; which amounts in law to a robbery: and in both these last cases the accessory before the fact is also excluded from his clergy. Secondly, in larcenies to the value of five shillings, committed, 1. By breaking any dwelling-house, or any out-house, shop, or warehouse thereunto belonging, in the day-time, although no person be therein; which also now extends to aiders, abettors, and accessories before the fact: 2. By privately stealing goods, wares, or merchandise, in any shop, warehouse, coach-house, or stable, by day or by night; though the same be not broken open, and though no person be therein: which likewise extends to such as assist, hire, or command the offence to be committed. Lastly, in larcenies to the value of forty shillings in a dwelling-house, or its out-houses, although the same be not broken, and whether any person be therein or not; unless committed against their masters by apprentices under the age of 15. This also extends to those who aid or assist in the commission of any such offence.

2. Larceny from the person is either by privately stealing, or by open and violent assault, which is usually called robbery. See Robbery.

The offence of privately stealing from a man's person, as by picking his pocket or the like, privily, without his knowledge, was debarred of the benefit of clergy so early as by the statute 8 Eliz. c. 4. But then it must be such a larceny as stands in need of the benefit of clergy, viz. of above the value of 12d.; else the offender shall not have judgment of death.—For the statute creates no new offence; but only takes away the benefit of clergy, which was a matter of grace, and leaves the thief to the regular judgment of the ancient law. This severity (for a most severe law it most certainly is) seems to be owing to the ease with which such offences are committed, the difficulty of guarding against them, and the boldness with which they were practised (even in the queen's court and presence) at the time when this statute was made: besides that this is an infringement of property in the manual occupation or corporal possession of the owner, which was an offence even in a state of nature. And therefore the saccularii, or cutpurses, were more severely punished than common thieves by the Roman and Athenian laws.

LARCH Tree, in botany. See Pinus.

LARD. The English name of hog's fat when melted down. Hog's lard, adeps suillæ, forms the base of many unguents, and is often eaten by the poor instead of butter.

To LARD. *v. a.* (*larder*, French.) 1. To stuff with bacon (*King*). 2. To fatten (*Shakspeare*). 3. To mix with something else by way of improvement (*Dryden*).

LA'RDER. *s.* (*lardier*, old French.) The room where meat is kept or salted (*Ascham*).

LA'RDERER. *s.* (from *larder.*) One who has the charge of the larder.

LARDNER (Nathaniel), an eminent English dissenting divine, was born at Hawkhurst in Kent, June 6, 1684. After a grammatical education, he was sent first to a dissenting academy in London, which was under the care of the Rev. Dr. Joshua Oldfield; and thence, in his 16th year, to prosecute his studies at Utrecht, under the celebrated professors D'Uries, Grævius, and Burman. Here he remained somewhat more than three years, and then removed for a short space to Leyden. In 1703 he returned to England, continuing at his father's house to employ himself by close and diligent preparation for the sacred profession which he had in view. Qualified as he was, it was not till 1709 that he preached his first sermon.

A few years after this, Lardner was received into Lady Treby's family as domestic chaplain and tutor to her son, and continued in this comfortable situation till her ladyships's death in 1721. This event threw him into circumstances of some perplexity, having preached to several congregations during his residence with Lady Treby, without the approbation or choice of any one congregation. Here we are told, "that it reflects no honour on the Dissenters, that a man of such merit should have been so long neglected. But it has been observed upon this, that the pulpit was not the place in which Lardner was calculated either to convey improvement or acquire reputation." Dr. Kippis afterwards informs us, "that his mode of elocution was very unpleasant; that from his early and extreme deafness he could have no such command of his voice as to give it a due modulation; and that he greatly dropped his words." It cannot then, as his biographer adds, be matter of surprise that he was not popular; nor, it may be added, can it be any reflection on the congregations to which he occasionally preached, that they did not choose for their minister a man, who, notwithstanding his great learning and amiable virtues, was so very deficient as a public speaker, that it was impossible to hear him with any pleasure, and scarcely without pain.

Though Lardner had no church at which he officiated as minister, he was engaged with some of his dissenting brethren in preaching a Tuesday evening lecture at the Old Jewry.—Acquainted probably with the direction of his studies, they appointed him to preach on the proof of the Credibility of the Gospel History. This he discussed, we are told, in two sermons; and prosecuting the subject which he had taken up in these discourses, in Feb. 1727, he published, in two volumes octavo, the first part of "The Credibility of the Gospel History, or, the Facts occasionally mentioned in the New Testament, confirmed by passages of ancient authors, who were contemporary with our Saviour or his Apostles, or lived near their time." An Appendix was subjoined, relating to the time of Herod's death.

Thus Lardner commenced author, and began his literary career with singular reputation. "It is scarcely necessary to say (observes Dr. Kippis), how well this work was received by the learned world. Not only was it highly approved by the Protestant dissenters, with whom the author was more immediately connected, but by the clergy in general of the established church; and its reputation gradually extended into foreign countries. It is indeed an invaluable performance, and hath rendered the most essential service to the cause of Christianity. Whoever peruses this work (and to him that does not peruse it, it will be to his own loss), will find it replete with admirable instruction, sound learning, and just and candid criticism." These two, with the subsequent fifteen volumes octavo, and the four thin quartos entitled "Jewish and Heathen Testimonies," occupied him, with the interruption arising from some smaller productions, during the long space of forty-three years.

Applauded as Dr. Lardner's works were, he received little recompense for them. Some of the latter volumes of the Credibility were published at a loss; and at last he sold the copy-right and all the remaining printed copies to the booksellers, for the trifling sum of 150l. His object, however, was not private emolument, but to serve the interests of truth and virtue; and it pleased divine providence to spare his life, both to complete his extensive plan, and to see the last volume, the fourth of the Testimonies, published. This was in 1767. He was seized with a decline in the summer following; and was carried off in a few days at Hawkhurst, the place of his nativity, where he had a paternal estate, in the 85th year of his age.

LARES, among the ancients, derived by Apuleius, De Deo Socratis, p. 689, from *lar*, familiaris; a kind of domestic genii, or divinities, worshipped in houses, and esteemed the guardians and protectors of families; supposed to reside more immediately in the chimney corner.

The Lares were distinguished from the Penates, as the former were supposed to preside over house-keeping, the servants in families, and domestic affairs, and the latter were the protectors of the masters of families, their wives and children: accordingly the Lares were dressed in short succinct habits, to shew their readiness to serve, and they held a sort of cornucopia in their

hands, as a signal of hospitality and good house-keeping. According to Ovid there were generally two of them, who were sometimes represented with a dog at their feet. Fast. 5. v. 146.

Plutarch distinguishes good and evil Lares, as he had before done good and evil Genii.

There were also some public, others private Lares.

Apuleius tells us the domestic Lares were no more than the souls of departed persons, who had lived well, and discharged the duties of their station; whereas those who had done otherwise, were vagabonds, wandering about, and frightening people, called Larvæ and Lemures.

The Lares were, however, sometimes called Penates, and were worshipped under the figures of little marmousets, or images of wax, silver, or earthen ware.

The public Lares were also called Compitales, from *compitum*, a cross-way; and Viales, from *via*, a way, or public road; as being placed at the meetings of roads, and in the highways, and esteemed the patrons and protectors of travellers.

Their private Lares took care of particular houses and families: these they also called Præstites, from *præsto:*

Quod præstant oculis omnia tuta suis.
Ovid. Fast.

They gave the name Urbani, i. e. Lares of cities, to those who had cities under their care; and Hostilii, to those who were to keep their enemies off. There were also Lares of the country, called Rurales, as appears by several antique inscriptions.

The Lares were also genial gods, and were supposed to take care of children from their birth. It is for this reason that when Macrobius tells us the Egyptians had four gods who presided over the birth of children, viz. the Genius, Fortune, Love, and Necessity, called Præstites, some interpret him as if he had said, the Egyptians had Lares; but they have mentioned that there was a great difference between the Lares of the Romans, and the Præstites of the Egyptians. However, the learned Mr. Bryant affirms that they were the same.

The ancients differ extremely about the origin of the Lares. Varro and Macrobius say, that they were the children of Mania; Ovid makes them the issue of Mercury, and the naiad Lara, whom Lactantius and Ausonius call Larunda; Apuleius assures us they were the posterity of the Lemures; Nigridius, according to Arnobius, made them sometimes the guardians and protectors of houses, and sometimes the same with the Curetes of Samothracia, which the Greeks call Idæi dactyli. Nor was Varro more consistent in his opinion of these gods; sometimes making them the manes of heroes, and sometimes gods of the air.

T. Tatius king of the Sabines, was the first who built a temple to the Lares. The chimney and fire-place in the house were particularly consecrated to them.

Tertullian tells us the custom of worshipping the Lares arose from this, that they anciently interred their dead in their houses; whence the credulous people took occasion to imagine their souls continued there also, and proceeded to pay them divine honours. To this it may be added, that the custom being afterwards introduced of burying in the highways, they might hence take occasion to regard them as gods of the highways.

LARGE. In music. A character, or note, formerly in use, of the greatest value or duration. Equal in length to two longs, four breves, eight semibreves, sixteen minims, thirty-two crotchets, sixty-four quavers, and so on in duple proportion.

LARGE. *a.* (*large*, French.) 1. Big; bulky (*Temple.*) 2. Wide; extensive (*Carew*). 3. Liberal; abundant; plentiful (*Thompson*). 4. Copious; diffuse (*Clarendon*). 5. *At* LARGE. Without restraint (*Bacon*). 6. *At* LARGE. Diffusively (*Watts*).

LA'RGELY. *ad.* (from *large.*) 1. Widely; extensively. 2. Copiously; diffusely; amply (*Watts*). 3. Liberally; bounteously (*Swift*). 4. Abundantly; without sparing (*Milton*).

LA'RGENESS. *s.* (from *large.*) 1. Bigness; bulk (*Sprat*). 2. Greatness; comprehension (*Collier*). 3. Extension; amplitude. (*Hooker*). 4. Wideness (*Bentley*).

LA'RGESS. *s.* (*largesse*, French.) A present; a gift; a bounty (*Denham*).

LARGHETTO. (*Ital.*) In music, a word specifying a time not quite so slow as that denoted by Largo, of which word it is the diminutive. See LARGO.

LARGI'TION. *s.* (*largitio*, Lat.) The act of giving.

LARGO. (*Ital.*) A word by which is to be understood a movement one degree quicker than Grave, and two degrees quicker than Adagio.

LARK, in Ornithology. See ALAUDA.

LARK'S-HEEL. } In botany. See DELPHINIUM.
LARK'S-SPUR. }

LARMIER, in architecture, a flat, square, massive member, of the cornice, between the cymatium and the ovolo; so called from its use, which is to disperse the water, and cause it to fall at a distance from the wall, drop by drop, or, as it were, by tears; *larme*, in French, signifying a tear. The *larmier* is also called corona; and in English, the drip.

LARRA. In entomology, a Fabrician tribe of the hymenopterous genus Tiphia, which see.

LARVA or LARVE, in natural history, a name given by Linnéus to insects in that state, called by other writers eruca or caterpillar. See ENTOMOLOGY and PAPILIO.

LARVÆ, in antiquity, derived from the Hetruscan word *lar* or *lars*, signifying "prince or lord," denoted the ghosts of the deceased, considered as wicked and mischievous. Hence is formed the term *lar-*

vatus, i. e. *larva indutus*, or *demoniac*. The ingenious Mr. Farmer urges the etymology and use of this term to prove, that the heathen demons were human ghosts. The larvæ were also called *lemures*.

Larvæ, in mineralogy, the same with petrifactions.

LA'RVATED. *a.* (*larvatus*, Lat.) Masked.

LA'RUM. *s.* (from *alarum* or *alarm*.) 1. Alarm; noise denoting danger (*Shakspeare*). 2. An instrument that makes a noise at a certain hour (*Wilkins*).

LARUS. Gull. In zoology, a genus of the class aves, order anseres. Bill straight, sharp edged, a little hooked at the tip, and without teeth; lower mandible gibbous below the point; nostrils linear, broader on the fore-part, and placed in the middle of the bill.

This genus is well known every where, being almost universally spread over the globe. It is distinguished from the other sea-fowl, by its strong, straight bill, bending down towards the point, and marked, below the under mandible, with a triangular prominency; by a light body, supported by large wings; and by slender legs, palmated feet, and a small back toe.

Though the gulls seem to prefer those lofty precipices that hang over the sea, yet there is no bird more frequent on every part of the shore. They have been found east, as far as Japan; and, in the north sea, considerably within the arctic circle. Those in the isles of Faro, are so strong and so voracious, that they sometimes tear lambs to pieces, and carry them to their nests; while those of the frozen ocean, with the greediness of vultures, unite in great flocks, and gorge themselves with the dead carcases of whales, and carry off large pieces to appease the hereditary gluttony of their young. They are found at sea, an hundred leagues distant from the land. One species leaves the shore, at certain seasons, to follow the plough, for the sake of the worms which it digs up; while others follow the course of the fishermen, in order to pick up any garbage they may throw away. These birds can accommodate themselves equally to the rigorous winters of the arctic regions, and to the excessive heat of the torrid zone, without suffering any apparent inconvenience from either. The nostrils of some are cereless; of others covered with a cere. The following are a few of the chief species:

1. L. Tridactylus. Tarrock. Kittiwake. Back whitish-hoary; quill-feathers white; hind-toe unarmed. The colours differ in the younger bird of this and of most of the species; they are also most of them spotted, till the third year, when the spots disappear gradually, which makes the discrimination of the species of this genus difficult. The bill is yellowish; mouth saffron within; head, neck, belly, and tail, snowy; wings hoary; the outer edge of the first, and tips of the fourth and fifth feathers white; legs dusky; hind-toe a mere wart. Inhabits our own country, and Europe, Asia, and America, generally.

2. L. Canus. Common Gull. White; back hoary; primary quill-feathers black at the ends, the fourth and fifth with a black spot at the tip, the outer one black without. The younger bird, head spotted with brown; neck brown above; tail-feathers white, with a black band; bill yellow, irids hazel; legs greenish-white. Inhabits Europe and America: 17 inches long.

3. L. Marinus. Black-backed Gull. White; back black. The aged bird, white; back and wings hoary; primary quill-feathers black towards the tip. The young bird, white; back cinereous; tail tipped with black; bill blackish; quill-feathers black; bill yellow; irids yellow. Inhabits Europe and America: 29 inches long; feeds on fishes and young birds; eggs blackish-grey, with dark purple spots.

4. L. Fuscus. Herring Gull. White; back brown; legs yellow; bill yellow; irids straw-colour. Inhabits Europe, North America, and Asia; migrates in winter to Iceland: 23 inches long; feeds on fishes, particularly herrings; to the shoals of which fishermen are directed by these birds hovering over and following them: whence the specific English name: eggs three, whitish, spotted with black.

5. L. Risibundus. Laughing Gull. Whitish; head blackish; bill and legs pale red. Two other varieties from variance of colour: eye-lids red; irids hazel; neck and chin dusky brown, in the full-grown bird black; first ten quill-feathers white, edged and tipt with black; the rest cinereous, tipt with white; claws black. Inhabits Europe and America: 15 inches long; makes a laughing kind of noise: eggs three, greenish-brown, spotted with tawny.

6. L. Parasiticus. Arctic Gull. Two middle tail feathers very long; bill and legs dusky; body above black; beneath, temples and front white; breast with a dusky band. Female, brown breast. Inhabits Europe, Asia, and America: 21 inches long; is very rapacious, and pursues the smaller gulls till they have discharged what they have lately eaten, which it dexterously catches and devours, before it reaches the water. Eggs cinereous, spotted with black.

The whole of the species here described, are found at times on the coasts of our own country.

LARYNGOTOMY, (*Laryngotomia*, *æ*, f. λαρυγξοτομια; from λαρυγξ, the larynx, and τεμνω, to cut). See Bronchotomy.

LARYNX, (*Larynx*, *ngis*, f. λαρυγξ.) A cartilaginous cavity, situated behind the tongue, in the anterior part of the fauces, and lined with an exquisitely sensible membrane. It is composed of the annular or cricoid cartilage, the scutiform or thyroid, the epiglottis, and two arytænoid cartilages.

The superior opening of the larynx is called the glottis. The laryngeal arteries are branches of the external carotids. The laryngeal veins evacuate their blood into the external jugulars. The nerves of the larynx are from the eighth pair. The use of the larynx is to constitute the organ of voice, and to serve also for respiration.

LASCI'VIENT. *a.* (*lasciviens*, Lat.) Frolicsome; wantoning.

LASCI'VIOUS. *a* (*lascivus*, Latin.) 1. Lewd; lustful (*South*). 2. Wanton; soft; luxurious (*Shakspeare*).

LASCI'VIOUSLY. *ad.* Lewdly; wantonly; loosely.

LASCI'VIOUSNESS. *s.* (from *lascivious.*) Wantonness; looseness (*Dryden*).

LASERPITIUM. Laser-wort. In botany, a genus of the class pentandria, order digynia. Fruit oblong, with membranaceous angles; petals inflected, emarginate, spreading. Twenty-three species: almost entirely natives of Europe; but one or two of the Cape and Palestine.

LASERPITIUM LATIFOLIUM. See GENTIANA ALBA.

LASERPITIUM SILER. See SESELI.

LASERWORT. In botany. See LASERPITIUM.

LASH. *s.* (*schlagen*, Dutch.) 1. A stroke with any thing pliant and tough (*Dryden*). 2. The thong or point of the whip (*Shak.*). 3. A leash, or string in which an animal is held: out of use (*Tusser*). 4. A stroke of satire; a sarcasm (*L'Estrange*).

To LASH. *v. a.* (from the noun.) 1. To strike with any thing pliant; to scourge (*Garth*). 2. To move with a sudden spring or jerk (*Dryden*). 3. To beat; to strike with a sharp sound (*Prior*). 4. To scourge with satire (*Pope*). 5. To tie any thing down to the side or mast of a ship: properly to *lace*.

To LASH. *v. n.* To ply the whip (*Gay*).

LA'SHER. *s.* (from *lash.*) One that whips or lashes.

LASIOPE'TALUM. In botany, a genus of the class pentandria, order monogynia. Corol wheel-shaped, bristly, five-cleft; stamens defended by a scale at the base: anthers with two lobes behind, and two pores at the tip; capsule superior, three-celled, three-valved; the divisions from the middle of the valves. One species: a downy plant of Australasia, with brown racemed flowers.

LASIO'STOMA. In botany, a genus of the class tetrandria, order monogynia. Calyx five-cleft, corol funnel-form, with a villous throat; capsules one-celled, two-seeded. One species: a Guiana shrub, with opposite branches furnished at the end with a simple tendril.

LASS. *s.* A girl; a maid; a young woman (*Philips*).

LASSA, a city of Asia, and capital of Great Thibet, in d'Anville's chart of Thibet, called Tonker; major Rennel says, much confusion arises from the application of so many different names to this capital of Thibet. Giorgi tells us, that the proper name of it, in the language of Thibet, is Baronthala; but that the Tartars call it Lassa, or Lahassa. Other accounts call it Tonker, and apply the names Lassa and Baronthala to the district which contains Tonker and Putala. And again, others give the name of Putala instead of Lassa to the capital of Thibet. But we ought to apply the name Lassa, or Lahassa, to the capital; and to consider Putala as the castle and palace of the lama, and his ordinary place of residence: 220 miles N.E. Patna. Lon. 91. 30 E. Lat. 30. 35 N.

LA'SSITUDE. *s.* (*lassitudo* Lat.) Weariness; fatigue (*More*).

LA'SSLORN. *a.* (*lass* and *lorn.*) Forsaken by his mistress: not used (*Shakspeare*).

LASSUS or LASUS, a dithyrambic poet, born at Hermione, in Peloponnesus, about 500 years before Christ, and reckoned by some among the wise men of Greece.—Some fragments of his poetry may be found in Athenæus.

LAST. *a.* (latert, Saxon.) 1. Latest; that follows all the rest in time (*Samuel*). 2. Hindermost; which follows in order of place (*Pope*). 3. Beyond which there is no more (*Cowley*). 4. Lowest; meanest (*Pope*). 5. Next before the present: as, *last* week. 6. Utmost (*Dryden*). 7. *At* LAST. In conclusion; at the end (*Gen.*). 8. *The* LAST; the end (*Pope*).

LAST. *ad.* 1. The last time; the time next before the present (*Shak.*). 2. In conclusion (*Dryden*).

To LAST. *v. n.* (læstan, Saxon.) To endure; to continue; to persevere (*Locke*).

LAST. *s.* (læst, Saxon.) 1. The mould on which shoes are formed (*Addison*). 2. (*last*, German.) A load; a certain weight or measure.

LAST, in general signifies, the burden or load of a ship. It signifies also a certain measure of fish, corn, wool, leather, &c. A last of codfish, white herrings, meal, and ashes for soap, is twelve barrels; of corn or rapeseed, ten quarters; of gunpowder, twenty-four barrels; of red herrings, twenty cades; of hides, twelve dozen; of leather twenty dickers; of pitch and tar, fourteen barrels; of wool, twelve sacks; of stock-fish, one thousand; of flax or feathers, 1700lb.

LA'STAGE. *s.* (*lestage*, Fr. *lastagie*, Dut.) 1. Custom paid for freightage. 2. The ballast of a ship.

LA'STERY. *s.* A red colour (*Spenser*).

LA'STING. *particip. a.* (from *last.*) 1. Continuing; durable (*Ray*). 2. Of long continuance; perpetual (*Boyle*).

LA'STINGLY. *ad.* Perpetually; durably.

LA'STINGNESS. *s.* (from *lasting.*) Durableness; continuance (*Newton*).

LA'STLY. *ad.* (from *last.*) 1. In the last place (*Bacon*). 2. In the conclusion; at last; finally.

LATCH. *s.* (*letse*, Dutch.) A catch of a door moved by a string, or a handle (*Smart*).

To LATCH. *v. a.* (from the noun.) 1. To fasten with a latch (*Locke*). 2. (*lecher*, Fr.) To smear (*Shakspeare*).

LA'TCHES. *s.* *Latches* or laskets, in a ship, are small lines like loops, fastened by sewing into the bonnets and drablers, in order

to lace the bonnets to the courses, or the drablers to the bonnets (*Harris*).

LATCHET. *s.* (*lacet*, Fr.) The string that fastens the shoe (*Mark*).

LATE. *a.* (læt, Saxon.) 1. Contrary to early; slow; tardy; long delayed (*Milton*). 2. Last in any place, office, or character (*Addison*). 3. The deceased: as, *the works of the* late *Mr. Pope*. 4. Far in the day or night.

LATE. *ad.* 1. After long delays; after a long time (*Philips*). 2. In a later season (*Bacon*). 3. Lately; not long ago (*Spenser*). 4. Far in the day or night (*Dryden*). 5. *Of late*; lately; in times past (*Milton*).

LATED. *a.* (from *late.*) Belated; surprised by the night (*Shakspeare*).

LATELY. *a.* (from *late.*) Not long ago (*Acts*).

LATENESS. *s.* (from *late.*) Time far advanced (*Swift*).

LATENT. *a.* (*latens*, Lat.) Hidden; concealed; secret (*Woodward*).

LATERAL. *a.* (*lateral*, Fr.) 1. Growing out on the side; belonging to the side (*Arbuth.*). 2. Placed, or acting on the side (*Milton*).

LATERAL EQUATION, the same as simple equation.

LATERAL COMMUNICATION OF MOTION, in liquids, a principle in consequence of which a liquid or fluid in motion urges on to accompany it, the particles which are contiguous or at the side of the particles already moving. M. Venturi has made use of this principle in some of his disquisitions. See HYDRODYNAMICS.

LATERAL SINUSSES. In anatomy. The bifurcation and continuation of the longitudinal sinusses of the dura mater. They commence about the middle of the tentorium, one passing along each horizontal crucial spine within the tentorium, and round to the foramen lacerum in basi cranii, where the internal jugular vein begins. Their use is to carry the blood from the brain into the internal jugulars, which return it to the heart.

LATERA'LITY. *s.* (from *lateral.*) The quality of having distinct sides (*Brown*).

LATERALLY. *ad.* (from *lateral.*) By the side; sidewise (*Holder*).

LATERAN (Plautus), a Roman consul elect A. D. 65. A conspiracy with Piso against the emperor Nero proved fatal to him. Being ordered to execution, he refused to confess his associates, and did not even frown at the executioner, who was as guilty as himself; and when a first blow could not sever his head from his body, he looked at the executioner, and shaking his head he returned it to the hatchet with the greatest composure, and it was cut off.

LATERAN was originally the proper name of a man, (see above:) whence it descended to an ancient palace in Rome, and to the buildings since erected in its place; particularly a church called St. John of Lateran, which is the principal see of the popedom.

LATERAN (Councils of the), are those held in the basilica of the Lateran: of those there have been five, held in 1123, 1139, 1179, 1215, and 1513.

LATERAN (Canons regular of the congregation of the), is a congregation of regular canons, whereof that church is the principal place or seat. It is pretended there has been an uninterrupted succession of clerks, living in community from the time of the apostles; and that a number of these were established in the Lateran in the time of Constantine. But the canons were not introduced till the time of Leo I. and these held the church 800 years, till the reign of Boniface, who took it from them, and placed secular canons in their room: 150 years after, the regulars were reinstated.

A LATERE, a term used to denote the qualifications of the cardinals whom the pope sends as legates into foreign countries. They are called legates a latere, as being his holiness's assistants and councellors in ordinary. These are the most considerable of the other three kinds of legates, being such as the pope commissions to take his place in councils; and so called, in regard that he never gives this office to any but his favourites and confidants, who are always *a latere*, at his side. A legate a latere has the power of conferring benefices without a mandate, of legitimating bastards to hold offices, and has a cross carried before him as the ensign of his authority.

DE LATERE, legates who are not cardinals, but yet are entrusted with an apostolical legation. See the article LEGATE.

LATE-WAKE, a ceremony used at funerals in the highlands of Scotland. The evening after the death of any person, the relations and friends of the deceased meet at the house, attended by bagpipe or fiddle; the nearest of kin, be it wife, son, or daughter, opens a melancholy ball, dancing, and greeting (i. e. crying violently) at the same time, and this continues till day-light; but with such gambols and frolics among the younger part of the company, that the loss which occasioned them is often more than supplied by the consequences of that night. If the corpse remains unburied for two nights, the same rites are renewed. Thus, Scythian-like, they rejoice at the deliverance of their friends out of this life of misery.

LATERIFOLIACEOUS FLOWER OF PEDUNCLE. In botany. Ad latus basus folii. By the side of the base of the leaf. As in Claytonia, Solanum, Asperifoliæ.

LATEWARD. *ad.* (*late*, and ƿeaꞃꝺ, Sax.) Somewhat late.

LATEX. (*latex*, quod in venis terræ lateat). All manner of water or juice. A term sometimes applied to the blood as being the spring or source of all the humours.

LATH, in building, a long, thin, and narrow slip of wood, nailed to the rafters of a roof or ceiling, in order to sustain the covering. These are distinguished into three kinds, according to the different kinds of wood of which they are made, viz. heart of oak, sap-laths, and deal laths; of which the two last are used for ceilings and partitions, and the first for tiling only. Laths are also distinguished according to their length, into five feet, four feet, and three feet laths, though the statute allows but of two

lengths, those of five and those of three feet, each of which ought to be an inch and a half in breadth, and half an inch in thickness; but they are commonly less.

LATHS (Cleaving of). The lath-cleavers having cut their timbers into lengths, they cleave each piece with wedges, into eight, twelve, or sixteen, according to the size of their timber; these pieces are called bolts: this is done by the felt-grain, which is that grain which is seen to run round in rings at the end of a piece of a tree. Thus they are cut out for the breadth of the laths, and this work is called felting. Afterwards they cleave the laths into their proper thicknesses with their chit, by the quarter-grain, which is that which runs in a straight line towards the pith. See GRAIN.

To LATH. *v. a.* (*latter*, French; from the noun.) To fit up with laths (*Mortimer*).

LATH. *s.* (læð, Saxon.) A part of a county (*Bacon*).

LATHE. *s.* The tool of a turner, by which he turns about his matter so as to shape it by the chisel. See TURNING.

To LA'THER. *v. n.* (leppan, Saxon.) To form a foam (*Baynard*).

To LA'THER. *v. a.* To cover with a foam of water and soap.

LA'THER. *s.* (from the verb.) A foam or froth made commonly by beating soap with water.

LATHRÆ'A. Toothwort. In botany, a genus of the class didynamia, order angiospermia. Calyx four-cleft; germ with a depressed gland at the base of its suture; capsule one or two-celled, mucronate; seeds few, angular, mucronate. Three species: one a plant of Palestine, one of the south of Europe, and one L. squamasia, common to our own groves.

LATHREVE, LEIDGREVE, or TRITHENGREVE, was an officer under the Saxon government, who had authority over a third part of the county; and whose territory was therefore called trithing, otherwise a leid or leithin, in which manner the county of Kent is still divided; and the rapes in Sussex seem to answer to the same.

LA'THYRUS. Chickling pea. In botany, a genus of the class diadelphia, order decandria. Style flat, villous above, broader upwards; two upper segments of the calyx shorter. Thirty-six species: chiefly leguminous plants of Europe, a few of Asia, Africa, and America: seven indigenous to the fields, pastures, and hedges of our own country. Of the whole, some have their peduncles one-flowered, some two-flowered, some many-flowered. The following are the chief:

1. L. latifolius. Everlasting pea. Peduncles many-flowered; tendrils with two elliptic leaves; stem winged. A native of our woods, and cultivated with ease in our gardens.

2. L. odoratus. Sweet-scented pea, or sweet-pea. Peduncles two flowered; tendrils two-leaved; leaflets ovate-oblong; legumes hairy. A native of Sicily; and so frequently cultivated and so well-known in our gardens as to render all description of its mode of increase unnecessary.

LATIAR, in Roman antiquity, a feast or ceremony instituted by Tarquinius Superbus, in honour of Jupiter Latiaris or Latialis.

LATICLAVE (*laticlavium*), in Roman antiquity, was an honourable distinction, peculiar, in the times of the republic, to the senators; but whether it was a particular kind of garment, or only an ornament upon it, the critics are not agreed: but the more general opinion is, that it was a broad stripe of purple sewed upon the fore part of their tunic, and round the middle of the breast.

LATIMER (Hugh), an English reformer, was the son of a farmer at Thurcaston in Leicestershire. Being designed for the church, he was sent to Cambridge, where he took his degrees in arts, and entered into orders. On the breaking out of the reformation he shewed himself a zealous papist, but his friend Thomas Bilney, who died a martyr to the truth, brought him off from his errors, and he became as zealous a protestant. This change was soon observed, and gave great offence to the heads of the university, especially as it was perceived that the new opinions gained ground daily. Mr. Latimer continued to preach in spite of academical censure, and was followed by great crowds of people. Henry VIII. had the curiosity to hear him, and expressed himself much pleased with his piety and talents. Latimer, however, had no ambition, and when that monarch issued a proclamation prohibiting the reading the scriptures, he wrote him a free expostulatory letter full of honesty and truth. The king received it in good part, and took Latimer into especial favour. Various attempts were made against his life, but he was preserved through the whole of that reign, and preferred to the bishopric of Worcester, in which diocese he laboured with great prudence and success in promoting the reformation. On the fall of his old friend lord Cromwell, Latimer, through the influence of Gardner, was sent to the Tower, where he remained till the accession of king Edward VI. He might then have returned to his diocese, but he chose rather to reside with archbishop Cranmer at Lambeth. He, however, made occasional journeys through various parts of the kingdom as an itinerant preacher, having the king's licence for that purpose. When Mary came to the throne he was apprehended and sent to the Tower, from whence he was sent with Ridley to Oxford, to have a public disputation with some of the popish divines. At this conference Latimer refused to abide by the authority of the fathers, but only by the scriptures. After it was ended, sentence of death was passed upon him; and he and Ridley were burnt at Oxford in 1554. Two volumes of his sermons are in print, and well known. (*Watkins*).

LATIN, a dead language, first spoken in Latium, and afterwards at Rome, and still used in the Romish church, and among men of letters.

Some authors rank the Latin among the number of original languages, but by mistake: it is formed principally from the Greek, and particularly from the Æolic dialect of that tongue; though it has a great number of words which it borrowed from the languages of the Etrusci, Osci, and other ancient people of Italy; and foreign commerce and wars, in course of time, added a great many more.

The Latin is a strong, nervous language, perfectly suitable to the character of the people who spoke it. The Romans were engaged in wars and commotions, foreign and domestic, which for seven hundred years engrossed all their thoughts. Hence, therefore, says the ingenious Mr. Harris, their language became like their ideas, copious in all terms, expressive of things political, and well adapted to the purposes both of history and popular eloquence. But the Romans were no philosophers; and hence the unfitness of their language to this subject; a defect, which even Cicero is compelled to confess, and more fully makes appear, when he writes philosophy himself, from the number of terms he is obliged to invent. Harris's Hermes, p. 411, &c.

The Latin is more figurative than the English, less pliant than the French, less copious than the Greek, less pompous than the Spanish, less delicate than the Italian, but closer and more nervous than any of them. See LANGUAGE.

For a while the Latin tongue was confined almost wholly within the walls of Rome; nor would the Romans allow the common use of it to their neighbours, or to the nations they subdued. Cicero observed, that even in his time, Greek was used almost among every people, but the Latin only confined to a very narrow compass. By degrees they were brought to grant the use of it as a favour; and in time became sensible of the necessity there was of its being generally understood, for the conveniency of commerce: and, accordingly, used their utmost endeavours that all the nations subject to their empire should be united by one common language: so that at length they imposed that as a law, which they had before granted as a favour.

After the translation of the seat of the empire from Rome to Constantinople, the emperors of the East, being always desirous of retaining the title of Roman emperors, appointed the Latin to be still retained in use, both in their rescripts and edicts, as appears by the constitutions of the eastern emperors, collected in the Theodosian code; but at length the emperors, neglecting the empire of the West, abandoned all care of the Latin tongue, and allowed their judges to pass sentence in Greek; and, accordingly, we find the emperor Justinian's Novels are composed in Greek.

Charlemagne, coming to the empire of the West, appointed the law-proceedings in sovereign courts to be made in Latin; and the notaries were to draw their acts and instruments in the same language: this practice continued a long time through great part of Europe; but at length it gave way, and the French took place of the Latin, not only in France, but in some measure in England also.

LATIN BIBLE. See BIBLE.

LATINI, the inhabitants of Latium. (Vid. LATIUM.)

LA'TINISM. *s.* (*latinisme*, Fr. *latinismus*, low Lat.) A Latin idiom; a mode of speech peculiar to the Latin (*Addison*).

LA'TINIST. *s.* One skilled in Latin (*Oldham*).

LATI'NITY. *s.* (*latinite*, Fr. *latinitas*, Latin.) The Latin tongue (*Dennis*).

To LA'TINIZE. *v. a.* (*latiniser*, Fr.) To use words or phrases borrowed from the Latin (*Dryden.*)

To LA'TINIZE. *v. n.* To give names a Latin termination, to make them Latin (*Watts*).

LATINUS, a son of Faunus by Marica, king of the Aborigines in Italy, who from him were called Latini, married Amata, by whom he had a daughter, called Lavinia, who was secretly promised in marriage by her mother to Turnus, king of the Rutuli. The gods opposed this union, and the oracles declared that Lavinia must become the wife of a foreign prince. The arrival of Æneas seemed favourable to this prediction, and Latinus, by offering his daughter to him, seemed to have fulfilled the commands of the oracle. Turnus, however, claimed Lavinia as his lawful wife, and prepared to support his cause by arms. Æneas then took up arms in his own defence, and after mutual losses it was agreed, that the quarrel should be decided by the two rivals. Æneas obtained the victory, and married Lavinia. Latinus soon after died, and was succeeded by his son-in-law.

LA'TISH. *a.* (from *late.*) Somewhat late.

LATIRO'STROUS. *a.* (*latus* and *rostrum*, Latin.) Broad-beaked (*Brown*).

LATIRITIOUS SEDIMENT. (*lateritius*; from *later*, a brick). A term applied to the brick-like sediment deposited in the urine of people afflicted with fever, twelve or fourteen hours after the urine is passed.

LATISSIMUS COLLI, in anatomy. See PLATYSMA MYOIDES.

LATISSIMUS DORSI. (*latissimus, musculus*). A muscle of the humerus, situated on the posterior part of the trunk. It is a very broad, thin, and for the most part fleshy muscle, placed immediately under the skin, except where it is covered by the lower extremity of the trapezius. It arises tendinous from the posterior half of the upper edge of the spine of the os ilium, from the spinous processes of the os sacrum and lumbar vertebræ, and from five or six, and sometimes from seven, and even eight, of the lowermost ones of the back; also tendinous and fleshy from the upper edges and external surface of the four false ribs, near their cartilages, by as many distinct slips. From these different origins the fibres of the muscles run in different directions: those from the ilium and false ribs run almost perpendicularly upwards; those from the sacrum and lumbar vertebræ, obliquely upwards and forwards; and

those from the vertebræ of the back, transversely outwards and forwards, over the inferior angle of the scapula, where they receive a small thin bundle of fleshy fibres, which arise tendinous from that angle, and are inserted with the rest of the muscle, by a strong, flat, and thin tendon, of about two inches in length, into the fore part of the posterior edge of the groove produced between the two tuberosities of the os humeri, for lodging the tendon of the long head of the biceps. In dissection, therefore, this muscle ought not to be followed to its insertion, till some of the other muscles of the os humeri have been first raised. Its use is to pull the os humeri downwards and backwards, and to turn it upon its axis. Riolanus, from its use on certain occasions, gave it the name of *ani tersor*. When we raise ourselves upon our hands, as in rising from off an arm-chair, we may easily perceive the contraction of this muscle. A bursa mucosa is found between the tendon of this muscle and the os humeri, into which it is inserted.

LATITANCY. *s.* (from *latitans*, Latin.) Delitescence; the state of lying hid. (*Brown*).

LATITANT. *a.* (*latitans*, Latin.) Delitescent; concealed; lying hid (*Boyle*).

LATITAT, a writ whereby all men in personal actions are called originally to the king's bench. F. N. B. 78.

A latitat may be considered either as the commencement of the action, or only as a process to bring the defendant into court, at the election of the plaintiff. Bul. N. P. 151.

If it is stated as the commencement of the action to avoid a tender, the defendant may deny that the plaintiff had any cause of action at the time of suing it out. 1 Wils. 141.

Or if it is replied to a plea of the statute of limitations, the defendant, in order to maintain his plea, may aver the real time of suing it out, in opposition to the test. 2 Burr. 950. See Impey's B. R. and C. B. Practice.

LATITATION. *s.* (from *latito*, Lat.) The state of lying concealed.

LATITUDE. *s.* (*latitude*, Fr.) 1. Breadth; width; in bodies of unequal dimensions the shorter axis (*Wotton*). 2. Room; space; extent (*Locke*). 3. The extent of the earth or heavens, reckoned from the equator to either pole (*Swift*). 4. A particular degree, reckoned from the equator (*Addison*). 5. Unrestrained acceptation (*King Charles.*) 6. Freedom from settled rules; laxity (*Taylor*). 7. Extent; diffusion (*Brown*).

Latitude, in geography, or navigation, the distance of a place from the equator; or an arch of the meridian, intercepted between its zenith and the equator. Hence the latitude is either north or south, according as the place is on the north or south side of the equator: thus London is said to be in 51° 31′ of north latitude.

Circles parallel to the equator are called parallels of latitude, because they shew the latitudes of places by their intersections with the meridian.

The latitude of a place is equal to the elevation of the pole above the horizon of the place: and hence these two terms are used indifferently for each other.

This will be evident from fig. 8. pl. 93, where the circle ZHQP is the meridian, Z the zenith of the place, HO the horizon, EQ the equator, and P the pole; then is ZE the latitude, and PO the elevation of the pole above the horizon. And because PE is $=$ ZO, being each a quadrant, if the common part PZ be taken from both, there will remain the latitude ZE $=$ PO the elevation of the pole. Hence we have a method of measuring the circumference of the earth, or of determining the quantity of a degree on its surface; for by measuring directly northward or southward, till the pole be one degree higher or lower, we shall have the number of miles in a degree of a great circle on the surface of the earth; and consequently multiplying that by 360, will give the number of miles round the whole circumference of the earth.

The knowledge of the latitude of the place is of the utmost consequence, in geography, navigation, and astronomy; it may be proper therefore to lay down some of the best ways of determining it, both by sea and land.

1st. One method is, to find the latitude of the pole, to which it is equal, by means of the pole star, or any other circumpolar star, thus: Either draw a true meridian line, or find the times when the star is on the meridian, both above and below the pole; then at these times, with a quadrant, or other fit instrument, take the altitudes of the star; or take the same when the star comes upon your meridian line; which will be the greatest and least altitude of the star: then shall half the sum of the two be the elevation of the pole, or the latitude sought. For, if abc be the path of the star about the pole P, Z the zenith, and HO the horizon: then is aO the altitude of the star upon the meridian when above the pole, and cO the same when below the pole; hence, because $a\mathrm{P} = c\mathrm{P}$, therefore $a\mathrm{O} + c\mathrm{O} = 2\mathrm{OP}$, hence the height of the pole OP, or latitude of Z, is equal to half the sum of aO and cO.

2d. A second method is by means of the declination of the sun, or a star, and one meridian altitude of the same, thus: Having, with a quadrant, or other instrument, observed the zenith distance Zd of the luminary; or else its altitude Hd, and taken its complement Zd; then to this zenith distance, add the declination dE when the luminary and place are on the same side of the equator, or subtract it when on different sides, and the sum or difference will be the latitude EZ sought. But note, that all altitudes observed must be corrected for refraction and the dip of the horizon, and for the semidiameter of the sun, when that is the luminary observed.

Circumstances frequently occur which render it impossible to observe the meridian altitude, or the maximum and minimum altitudes of any celestial objects; when, of course, the above methods fail. We shall, therefore, sub-

join some of the most approved practical methods of determining the latitude in cases of this kind.

For this purpose take one, two, or more altitudes of the sun in the forenoon, noting by a watch the time of each; and if the meridian altitude, take one, two, or more altitudes of the sun in the afternoon, noting also the times by the watch: if possible, let the morning altitudes, if three, be taken at equal intervals of time; if not, let the afternoon observations be taken at the same altitudes with the morning ones. Then,

1. If one morning and one afternoon observation are taken, when the sun has the same altitude, and the name of the elevated pole is known, to find the elevation or latitude. To 12 hours add the morning and afternoon times shewn by the watch, and half the sum gives the time by the watch, when the sun was on the meridian of that place, supposing no change of declination. Let the interval of time between that noon and the time of either observation be turned into degrees and minutes for the hour-angle, which is supposed to be less than 90°, because the observations are within six hours of noon: to the logarithmic cosine of the hour-angle add the logarithmic tangent of the sun's distance from the elevated pole, their sum is the log. tangent of the first arc, of the same kind with the polar distance: add the arithmetical complement of the log. cosine of the polar distance, the log. sine of the altitude, and the log. cosine of the aforesaid first arc, their sum is the log. cosine of a second arc, always less than 90°: the difference of the first and second arcs is the complement of the required latitude, when the first arc exceeds the second; otherwise, the difference is the latitude. See EQUAL ALTITUDE.

2. When three zenith distances between the limits of 30° and 70° are taken within an hour of noon, at equal intervals of time between 15 and 30 minutes. If the first and third zenith distances are equal, the middle one is the meridian zenith distance. If the two first or two last zenith distances are equal, from one of these take one-eighth of the difference between it and the greater zenith distance, and the remainder is that on the meridian. When the three zenith distances are unequal, let the difference between the greatest and middle be called A, the difference between the greatest and the least be called B, the difference between B and 4 A be called C, and the difference between B and C be called D: then $\frac{C^2}{4D}$, will give a number of minutes, which, subtracted from the greatest zenith distance, leaves the meridian zenith distance.

3. When three zenith distances, between the limits of 30° and 70° are taken within an hour and half of noon, at unequal intervals of time: let the difference in minutes between the greatest and middle zenith distances be called A, and the interval of time a; the difference between the first and last be called B, and the corresponding interval of time b. From the logarithm of the difference of the products Ab and Ba, take the logarithm of b, and call the remainder N; then add the log. of N, twice the log. of the difference between a and $\frac{1}{2}b$, the arithmetical complement of the difference between a and b, and the arithmetical complement of the log. of a, and the sum will give a log. which call M. Find the numbers corresponding to N, M, and $\frac{1}{2}$ B, and call their sum E. From 4 E take B, and call the remainder C, and B—C call D. Then the log. of 4 D, taken from twice the log of C, gives the logarithm of the correction in minutes; and the greatest zenith distance diminished by the correction, will give the meridian zenith distance.

4. When three altitudes are taken at equal intervals of time, at any distance from noon: find the natural sines of the three given altitudes; call the difference between the first and third, D; and between the second and third F. Let $E = D + 2F$, when the degrees of the third altitude fall between those of the first and second; otherwise let $E = D - 2F$. Add the log. cotang. of half one interval of time in degrees, the log. of E, and the ar. co. log. of D, each in numbers; and their sum is the logarithmic tangent of an angle A, or of its supplement, if the first altitude exceeds the third; convert the angle A into time; to A add one interval; then the difference between this sum and six hours will shew the time from noon, when the last observation was made. Hence, by the intervals the other times are known relative to the noon of the place of observation. Add together the ar. co. log. cosine of A, the ar. co. log. sine of one interval observed, and the log. of D; and their sum is the log. of a number B; to the log. of which add twice the logarithmic sine of half the least time from noon; seek the number, and add it to the natural sine of the greatest altitude, which will give the natural sine of the meridian altitude. The number B, lessened by the natural sine of the meridian altitude, gives the natural sine of the midnight depression: then the half sum and the half difference, being taken, of the degrees and minutes answering to the sines of the meridian altitude and midnight depression, will give the co-latitude and declination. If the zenith falls between the equator and the sun, the half sum is the co-declination, and the half difference is the latitude.

5. When three altitudes are taken at unequal intervals of time: call the interval between the first and third times M, between the first and second, m, between the second and third, n, and convert M, m, n, into degrees; find the natural sines of the three observed altitudes; call the difference between the first and third D, and between the second and third F; add the log. sines of $\frac{1}{2}m$ and $\frac{1}{2}n$, for the log. of $\frac{1}{2}$ A; and the log. cosine of $\frac{1}{2}m$ to the log. sine of $\frac{1}{2}n$ for the log. of $\frac{1}{2}$ B: add the ar. co. log. of D, the log. of F, and the log. sine of $\frac{1}{2}$ M, for the log. of $\frac{1}{2}$ C: take the difference between $\frac{1}{2}$ B and $\frac{1}{2}$ C, and call it $\frac{1}{2}$ E: or let $\frac{1}{2}$ E be the sum of $\frac{1}{2}$ B

and ½ C, when the degrees in the third altitude fall between those of the first and second. From the log. of ½ E take the log of ½ A, the remainder, adding 10 to the index, is the logarithmic tangent of an arc G; or of its supplement, when the first altitude exceeds the second. Take the difference between G, and the complement of ½ M, the remainder is an arc H, shewing the time from noon when the last altitude was taken: hence the other times are known. Add the ar. co. log. cosine of G, the ar. co. log. sine of ½ M, and the log. of D, their sum is the log. of a number I: to log. of I add twice the log. sine of ½ H for the log. of K, which, added to the natural sine of the third altitude, will give the natural sine of the meridian altitude; and the number I, diminished by the natural sine of the meridian altitude, gives the natural sine of the midnight depression; the half sum and half difference of the degrees shewing the meridian altitude and midnight depression, will give the co-latitude and declination or co-declination and latitude, when the zenith falls between the sun and the equator.

6. When two altitudes of the sun, the interval of time between the two observations, the sun's declination, and the latitude by dead reckoning, are given; to find the true latitude. 1. Convert the interval of time into degrees, and take its half; take also the half sum and half difference of the two altitudes. 2. Add the five following logarithms; viz. log. cosine of the half sum of the two altitudes; log. sine of the half difference of the two altitudes; ar. co. log. sine of the half interval; ar. co. log. cosine of the declination, and ar. co. log. cosine of the latitude by account; their sum is the log. sine of an arc. 3. Half the difference between this arc and the half interval, is half a time from noon. 4. Then add the log. cosine of the declination, log. cosine of the latitude by account, and twice the log. sine of half a time from noon, in degrees: the number answering to the log. of this sum, doubled, is the correction; which being added to the natural sine of the greatest observed altitude, gives the natural sine of the meridian altitude, whence the latitude is known. In order to know whether the latitude thus found be accurate, make a second operation: thus, to the sum of the first four logs. used in the second article of the preceding operation, add the ar. co. log. cosine of the latitude found by art. 4. the sum is the log. sine of an arc. Proceed by the third and fourth articles for a corrected latitude; and if it comes out the same, within a minute or two, as that found above, it may be esteemed the true latitude; or, if the difference between the results of the two operations do not exceed about ⅕th of the difference between the latitude assumed, and that first found, the last result may be accounted sufficiently correct. But if the difference is much greater than the said ⅕th part, then a third operation with the last found latitude will generally give the latitude exact enough. When the latitudes, found by the first and second operations, have one greater and one less than the latitude by account, or if they differ by a degree or more, make a third operation with the half sum or mean of these two latitudes; and if the latitude found differs from the said mean, then half their sum will generally give the latitude very near the truth. When both observations are made in the forenoon, or both in the afternoon, the half interval is half the difference of the times from noon, and the first found arc is half the sum of the times from noon: but when the observations occur, one before and the other after noon, the ½ interval is the ½ sum, and the first found arc is the half difference of the times from noon; the ½ difference added to the ½ sum, gives the time of the observation farthest from noon; and the ½ difference taken from the ½ sum, gives the time of the observation nearest to noon. The times of observation are best when taken to seconds, or at least to quarters or thirds of a minute of time: they are also best when taken between the times of 9 h. A. M. and 3 h P. M. and the interval between them should not exceed five hours, nor be much less than the time from noon at the taking of the greatest altitude; or, in general, the interval should not be much less than about ¾ of an hour.

Mr. John Douwes of Amsterdam contrived, in 1740, solar tables for the solution of this problem, which were published in 1759. Dr. Pemberton communicated to the Royal Society the whole construction of these tables, &c. in a paper published in the Phil. Trans. vol. li. art. 81.; and afterwards the tables were published in a folio volume. But the preceding solution requires no other tables than are found in the common books of navigation; though the solar tables, such as may be found in the Nautical Almanac for 1771, may save some time in the computation. See the principles on which the preceding problems are founded, mathematically demonstrated, and their use illustrated by examples, in Robertson's Elem. of Navigation, book v. and book ix. See also Nautical Almanac for 1771; and the requisite tables for various other rules. For professor Lax's method of solving the problem, see the Phil. Trans. for 1799, part i. See also Mackay's Treatise on finding the latitude and longitude at sea, and O. Gregory's Astronomy, ch. 23.

The preceding methods ascertain the apparent latitude, that is, the angle formed between a plumb-line at the given place, and a diameter of the equator: the true latitude, or the angle at the centre of the spheroid, subtended between the given place and the equator, may be correctly found thus: Divide the square of the polar axis of the spheroid by the square of the equatoreal axis, and multiply the tangent by the apparent latitude of the place by the quotient, the product is the tangent of the latitude at the centre. This rule is demonstrated in O. Gregory's Astronomy, p. 445; also in Simpson's Fluxions, vol. ii. p. 506. Since the earth's axes are nearly as 214 to 215, we may assume $\frac{214^2}{215^2} = \cdot9907193$ for a common multiplier, by which, if the nat. tangent of the apparent latitude be multiplied, the product will

be the nat. tangent of the latitude at the centre. Mr. Richard Graham contrived an instrument for taking the latitude of a place at any time of the day. For this purpose, to the meridian of a globe properly divided, he adapts a piece of a like meridian, called the beam-compass, divided in the same manner, and sliding under the meridian: to these circles, and to five minutes of their degrees, are fitted two sliding Vernier's scales, in such a manner, that a wire fixed at 0 degree at the centre or end of the beam-compass, shall pass through a hole at the beginning of the divisions of one Vernier, which is to slide on the meridian, that wire serving as the center of motion of the beam-compass when the Vernier is screwed to the meridian: the other Vernier is to slide on the beam-compass, and carry with it a pointer, or index, at the beginning of its divisions.

With this instrument the problem is thus solved. At the time of the first observation, let the sun's bearing be also observed, and take the difference between the rhumb on which the sun was observed, and the rhumb on which the ship steered between the observations: then say,

As radius is to the cosine of that difference of rhumbs; so is the distance run between the observations, to the minutes of correction to be applied to the first zenith distance, and is to be added when the ship sails from the sun, otherwise it is to be subtracted.

Then slide the Vernier's scale on the meridian to the given declination, and the Vernier on the beam-compass to the first zenith distance as corrected, and let these scales be fixed by their screws: rectify the globe for noon, turn it till the hour-index points at the time of the first observation, there hold the globe fast, and move the beam-compass on its center, nearly into the azimuth of the sun at that observation, and describe an arc on the globe with the pointer of the Vernier; slide the Vernier on the beam-compass to the second observed zenith distance; turn the globe (the proper way) till the hour-index points at the time of the second observation, there hold the globe fast, and with the beam-compass cut the former arc, their intersection will shew the place of the ship at the time of the second observation: bring the meridian over that point, and the latitude is found; also the hour-index will point at the true time of the day when the last observation was made. Phil. Trans. No. 435.

LATITUDE, in astronomy, is the distance of a star or planet from the ecliptic.

Or, it is an arch of a great circle, intercepted between the center of the star, and the ecliptic and perpendicular thereto.

Through the poles of the ecliptic are supposed to pass an indefinite number of great circles, cutting the ecliptic at right angles, called circles of latitude, or secondaries of the ecliptic; by means of which every star, and point of the heavens, is reduced to the ecliptic, and has its place in regard thereto determined; the latitude of a star being an arch of one of these secondaries, intercepted between that star, and the point where it intersects the ecliptic.

In which the latitude differs from the declination, which is the distance of a star from the equator towards one of the poles of the world. So that the geographical latitude is the same thing with the astronomical declination; and the astronomical latitude a quite different thing.

The latitude of a planet is an angle, under which a planet's distance from the ecliptic is seen on the earth.

The sun never has any latitude, but the planets have; for which reason, in the common sphere, the zodiac has some breadth. The ancients only allowed six degrees on each side the ecliptic, but the moderns have extended it to nine.

When they have no latitude, they are said to be in the nodes of the ecliptic, or in the intersection of their orbit with that of the sun; and in this situation it is that they eclipse, or are eclipsed by, the sun.

LATITUDE (Circle of), is a great circle passing through the poles of the ecliptic.

LATITUDE OF THE MOON (North ascending), is when she proceeds from the ascending node towards her northern limit, or greatest elongation.

LATITUDE (North descending), is when the moon returns from her northern limit to the descending node.

LATITUDE (South descending), is when she proceeds from the descending node to her southern limit.

LATITUDE (South ascending), is when she returns from her southern limit to her ascending node.

And the same holds good of the other planets.

LATITUDE OF A PLANET (Heliocentric), is its distance from the ecliptic, such as it is seen from the sun. This when the planet comes to the same point of its orbit, is always the same, and unchangeable.

LATITUDE OF A PLANET (Geocentric), is the distance of the planet from the ecliptic, as it is seen from the earth.

This, though the planet be in the same point of its orbit, yet is not constantly the same, but alters according to the position of the earth, in respect to the planet.

LATITUDINA'RIAN. *a.* (*latitudinarius*, low Lat.) Not restrained; not confined (*Col.*).

LATITUDINA'RIAN, *s.* One who departs from orthodoxy.

LATIUM (anc. geog.), the country of the Latins, at first contained within very narrow bounds, but afterwards increased by the accession of various people. The appellation, according to Virgil, is *a latendo*, from Saturn's lying hid there from the hostile pursuits of his son Jupiter; and from Latium comes the name Latini, the people, (Virgil): though Dionysius Halicarnassæus derives it from king Latinus, who reigned about the time of the Trojan war. But whatever be in this, it is certain, that Latium, when under Æneas and his descendants, or the Alban kings, contained only the Latins, exclusive of the Æqui, Volsci, Hernici, and other people; only that Æneas reckoned the Rutuli,

after their conquest, among the Latins. And this constituted the ancient Latium, confined to the Latins: but afterwards, under the kings, and after their time, it reached from the Tiber to Circeii. Under the consuls, the country of the Æqui, Volsci, Hernici, &c. after long and bloody wars, was added to Latium, under the appellation adjectitious or superadded Latium, as far as the river Liris, the eastern boundary, and to the north as far as the Marsi, and Sabines. The various people, which in succession occupied Latium, were the Aborigines, the Pelasgi, the Arcades, the Siculi, the Arunci, the Rutuli; and beyond Circeii, the Volsci, the Osci, the Ausones: but who first, who next, occupied the country, it is difficult to say.

LATMUS, a mountain of Caria near Miletus, famous for the residence of Endymion, whom the moon regularly visited in the night, whence he is often called Latmus Heros.

LATOMIA, properly signifies a stone quarry: but places whence stones had been dug having been made use of sometimes as dungeons, jails, or prisons for criminals, it is oftentimes applied as a name for a prison. There was a place of confinement of this sort at Rome, near the Tullianum; another at Syracuse, in which Cicero says Verres had shut up Roman citizens.

LATONA, a daughter of Cœus, the Titan, or, according to Homer, of Saturn. She is celebrated for the favours which she granted to Jupiter. Juno, always jealous of her husband, sent the serpent Python to persecute her. Latona wandered from place to place in the time of pregnancy, continually alarmed for fear of Python. She was driven from heaven, and Terra refused to give her a place where she might rest and bring forth. Neptune, moved with compassion, struck with his trident, and made immovable the island of Delos, which before wandered in the Ægian sea. Latona changed into a quail by Jupiter, came to Delos, where she resumed her original shape, and gave birth to Apollo and Diana. Juno obliged her to fly from Delos. After having wandered over the greatest part of the earth, and experienced the violence of Niobe and Tityus, (Vid. Niobe and Tityus) she at length, though exposed to the resentment of Juno, became a powerful deity, and saw her children receive divine honours. Her worship was generally established where her children received adoration, particularly at Argos, Delos, &c. where she had temples.

LATRANT. *a.* (*latrans.* Lat.) Barking.

LATRIA, in theology, a religious worship due only to God. The Romanists say, "they honour God with the worship of latria, and the saints with the worship of dulia." But the terms, however distinct, are usually confounded. The worship of latria, besides its inner characters, has its external marks to distinguish it; the principal whereof is sacrifice, which cannot be offered to any other but God himself, as being a solemn acknowledgement or recognition of the sovereignty of God, and our dependance on him. Mr. Daille seems to own, that some of the fathers of the fourth century allowed the distinction between latria and dulia.

LATRINÆ, were public houses of office, or necessaries, amongst the Romans.

LATRUNCULI, a game amongst the Romans of much the same nature with our chess. The latrunculi were properly the chess-men, called also latrones and calculi. They were made of glass, and distinguished by black and white colours. Sometimes they were made of wax or other convenient substances. Some give the invention of this game to Palamædes, when at the siege of Troy; Seneca attributes it to Chilon, one of the seven Grecian sages; others honour Pyrrhus with the invention; and others again contend that it is of Persian origin. See Chess.

LATTEN, denotes iron plates tinned over, of which tea-canisters, &c. are made. Plates of iron being prepared of a proper thickness, are smoothed by rusting them in an acid liquor, as common water made eager with rye: with this liquor they fill certain troughs, and then put in the plates, which they turn once or twice a day, that they may be equally rusted over; after this they are taken out, and well scowered with sand, and, to prevent their rusting again, are immediately plunged into pure water, in which they are to be left till the instant they are to be tinned or blanched, the manner of doing which is this: they flux the tin in a large iron crucible, which has the figure of an oblong pyramid with four faces, of which two opposite ones are less than the two others. The crucible is heated only from below, its upper part being luted with the furnace all round. The crucible is always deeper than the plates, which are to be tinned, are long; they always put them in downright, and the tin ought to swim over them; to this purpose artificers of different trades prepare plates of different shapes; though M. Reaumur thinks them all exceptionable. But the Germans use no sort of preparation of the iron, to make it receive the tin, more than the keeping it always steeped in water, till the time; only when the tin is melted in the crucible, they cover it with a layer of a sort of suet, which is usually two inches thick, and the plate must pass through this before it can come to the melted tin. The first use of this covering is to keep the tin from burning; for if any part should take fire, the suet would soon moisten it, and reduce it to its primitive state again. The blanchers say, this suet is a compounded matter; it is indeed of a black colour, but M. Reaumur supposed that to be only an artifice, to make it a secret, and that it is only coloured with soot or the smoke of a chimney; but he found it true so far, that the common unprepared suet was not sufficient; for after several attempts, there was always something wanting to render the success of the operation certain. The whole secret of blanching, therefore, was found to lie in the preparation of this suet; and this, at length, he discovered to consist only in the first frying and burning it. This simple

operation not only gives it the colour, but puts it into a condition to give the iron a disposition to be tinned, which it does surprisingly. The melted tin must also have a certain degree of heat, for if it is not hot enough, it will not stick to the iron; and if it is too hot, it will cover it with too thin a coat, and the plates will have several colours, as red, blue, and purple, and upon the whole will have a cast of yellow. To prevent this, by knowing when the fire has a proper degree of heat, they might try with small pieces of iron; but in general, use teaches them to know the degree, and they put in the iron when the tin is at a different standard of heat, according as they would give it a thicker or thinner coat. Sometimes also they give the plates a double layer, as they would have them very thickly covered. This they do by dipping them into the tin, when very hot, the first time; and when less hot the second. The tin which is to give the second coat must be fresh covered with suet, and that with the common suet, not the prepared.

Latten brass, plates of milled brass reduced to different thicknesses, according to the uses for which they are intended.

LA'TTER. *a.* 1. Happening after something else. 2. Modern; lately done or past (*Locke*). 3. Mentioned last of two (*Watts*).

LA'TTERLY. *ad.* (from *latter.*) Of late.

LA'TTICE. *s.* (*lattis*, French.) A reticulated window; a window made with sticks or irons, crossing each other at small distances (*Cleaveland*).

To La'ttice. *v. a.* (from the noun.) To decussate, or cross; to mark with cross parts like a lattice.

LATTICED. In botany. Cancellatus. Applied to the involucre in atractylis cancellata; and to the capsule of lily.

LATTIMO, in the glass trade, a name for a fine milk-white glass. There are several ways of making it, but the best of all is this: take four hundred weight of crystal frit, and sixty pounds of calcined tin, and two pounds and an half of prepared manganese; mix these well with the frit, and set them in a pot in a furnace to melt and refine. At the end of eighteen hours this will be purified; then cast it into water, purify it again afterwards in the furnace, and make a proof of it. If it be too clear add fifteen pounds more of calcined tin; mix it well with the metal, and let it stand one day to purify; it will then be of a whiteness surpassing even that of snow, and is fit to work into vessels.

LATUS RECTUM, in conic sections, the same with Parameter; which see.

Latus transversum, of the hyperbola, is the right line between the vertices of the two opposite sections; or that part of their common axis lying between the two opposite cones. It is the same as the transverse axis of the hyperbola, or opposite hyperbolas.

Latus primarium, a right line, drawn through the vertex of the section of a cone, within the same, and parallel to the base.

LAVA. In mineralogy, a genus of the class earths, order argillaceous. Consisting of alumine with a larger portion of silex and oxyd of iron, and frequently a little carbonat of lime, and carbonat of magnesia; generally of a dull colour, becoming hoary when scraped, meager, breaking into indeterminate fragments, mouldering into argil in the air: produced by the internal fires of volcanic mountains from which it is thrown out, and melting into a black glass. Six species; the following are the chief:

1. L. compacta. Compact lava. Nearly opake, compact, hardish, of a conchoidal texture. Found in volcanic mountains and their neighbourhood, appearing to have been fused by the action of fire, but not vitrified, and becoming when cooled close and solid, and bearing the resemblance of its original mineral; colour generally blackish, sometimes grey, brown, or red, rarely white, very rarely green or blue: its substance so very little porus as to admit being cut into slabs, with an almost entire surface and marble polish; fracture earthy or fine splintery, more rarely foliated; contains often hornblend, white garnet, olivin, calcareous spar, mica, schorl, &c.

2. L. pumex. Pumice stone: of which there are several varieties; one, opake, without lustre, parallel, fibrous, porous, light, rough. A second, fibrous with elongated pores. A third, hardly fibrous, with very minute pores. Found in the ashes of most volcanic mountains, whence it is washed down into the sea; colour grey, greyish-white, brown or reddish, rarely yellowish: the fibres are generally parallel, more or less discernible, and have a silky lustre; does not effervesce with acids; melts into a white enamel. See Volcano.

The quantity of matter thrown out from volcanoes under the name of lava is prodigious. After the great eruption of Etna in 1669, Borelli went from Pisa to Sicily to observe the effects of it. The matter thrown out at that time amounted to 93,830,750 cubical paces; so that, had it been extended in length upon the surface of the earth, it would have reached more than four times round the whole earth. All this matter, however, was not lava, but consisted also of sand, stone, gravel, &c. The lava he computed at 6,300,000 paces, which formed a river, according to our author, sometimes two miles broad; but according to others it was six or seven miles broad, and sometimes 20 or 30 yards in depth. Sir William Hamilton informs us, that the lavas of Etna are very commonly 15 or 20 miles in length, six or seven in breadth, and 50 feet deep. The most considerable is scarce less than 30 miles long and 15 broad. The most considerable lavas of Vesuvius do not exceed seven miles in length. The same author, however, tells us, that the lava which issued from Vesuvius in 1767 was six miles long, two in breadth, and in most places 60 or 70 feet deep. In one place it had run along a hollow-way made by currents of rain, not less than 200 feet deep and 100 wide; and this vast hollow it had in one place filled up.

He says, he could not have believed that so great a quantity of matter could have been thrown out in such a short time, if he had not examined the whole course of it himself. Even this quantity, however, great as it is, appears very trifling in comparison of that thrown out in Iceland in the year 1783, which covered a space of ground 90 miles in length and 42 in breadth, to the depth of more than 100 feet. Dr. Von Troil, in his letters on Iceland, tells us, that he and his companions travelled over a tract of lava upwards of 300 miles in length: and in 1728, we are told that an eruption of lava took place, which continued for two years to run into a great lake, which it almost filled up.

As the lavas are thrown out from the volcanoes in the highest degree of ignition, it may easily be supposed that such vast bodies will retain their heat for a long time. It would indeed be well worth observing, what length of time is required to cool a lava perfectly; as from thence we might in some measure judge how far those philosophers are in the right, who argue concerning the length of time required to cool an ignited globe of the size of our earth or larger. Sir William Hamilton tells us, that in the month of April 1771, he thrust sticks into some of the crevices of the lava which had issued from Vesuvius in October 1767, and they immediately took fire. On Mount Etna, in 1769, he observed the lava that had been disgorged three years before to smoke in many parts. No particular observation, however, hath been made in what proportion the heat of lavas is gradually lost.

Sir William Hamilton informs us of a curious fact relating to a lava in the island called Lacco. 'Here is a cavern shut up with a door; and this cavern is made use of to cool liquors and fruit, which it does in a short time as effectually as ice. Before the door was opened, he felt the cold on his legs very sensibly; but when it was opened, the cold rushed out so as to give him pain; and within the grotto it was intolerable. He was not sensible of wind attending this cold; though upon Mount Etna and Vesuvius, where there are caverns of this kind, the cold is evidently occasioned by a subterraneous wind: the natives call such places ventaroli. From old lavas there also frequently happens an eruption of noxious vapours called mofetes. These likewise break out from wells and subterraneous places in the neighbourhood of a volcano before an eruption. Our author tells us, that the vapour affects the nostrils, throat, and stomach, just as the spirit of hartshorn or any strong volatile salt; and would soon prove fatal if you did not immediately withdraw from it. These mofetes, he says, are at all times to be met with under the ancient lavas of Vesuvius, particularly those of the great eruption of 1631.

LAVAL, a considerable town of France, in the department of Maine, with two castles. Since the revolution it has been erected into a bishopric; and the inhabitants are computed at 24,000. Linen of all kinds and qualities is manufactured here; and the neighbouring quarries produce green marble, or black veined with white. It is seated on the Maine, 15 miles S. of the town of that name, and 40 W. of Mans. Lon. 0. 42 W. Lat. 48. 7 N.

LAVANDULA. Lavender. In botany, a genus of the class didynamia, order gymnospermia. Calyx ovate, slightly toothed, supported by a bracte; corol reversed; stamens within the tube. Eight species: chiefly of the south of Europe. The following are the chief:

1. L. spica. Spike or common lavender. Leaves sessile, lance-linear, revolute at the edge; spike interrupted, naked, with blue flowers. The taste of the flowers is bitter, warm, and somewhat pungent; the leaves are weaker and less grateful. The essential oil obtained from them by distillation is a bright yellow colour, of a very pungent taste, and possesses if carefully distilled the fragrance of the lavender in perfection. The use of the leaves and flowers of this species has been long recommended in nervous debilities and various affections proceeding from want of energy in the animal functions. The London College directs an essential oil, a simple spirit, and a compound tincture, to be kept in the dispensatories. Europe.

2. L. stœchas. French lavender. Leaves sessile, linear, downy, revolute at the edge; spike contracted, comose; bractes about three-lobed. South of Europe.

3. L. viridis. Leaves sessile, linear, wrinkled, villous; revolute at the edge; spike comose; bractes undivided. A native of Madeira.

4. L. dentata. Leaves sessile, linear, with pectinate divisions; spike contracted, comose. Spain.

The first species is a shrubby plant, and is propagated by cuttings or slips; the best season for which is March; the cuttings should be planted in a shady situation, or may be shaded with mats till they have taken root, after which expose them to the sun, and when they have acquired strength, remove them to the places where they are designed to remain: they succeed best upon the most barren and rocky soil, in which they will endure the severest winters. The second sort is a biennial plant, the seeds of which may be sown every spring on borders or beds of light fresh earth, and when the plants arise, they may be transplanted into other borders of the flower-garden, or into pots, where they will require no other care than to be kept free from weeds. The third and fourth species are shrubby plants; the third is managed like the first sort, but the fourth being tenderer, must be sown on a moderate hot-bed in the spring, and when the plants come up they should be planted each in a separate small pot, filled with light earth, and plunged into another hot-bed, to bring them forward; in the beginning of June they may be inured to the external air, where they should be planted in an open situation toward the end of the month. They may be preserved through the winter in a good green-house, and will produce flowers through most part of the season, as well as fertile seeds.

LAVARET, in ichthyology. See Salmo.

LAVATER (John Gaspard Christian), a celebrated physiognomist, was born at Zurich, in Switzerland, in 1741. He was brought up a protestant minister, entered into holy orders in 1761; in 1778, was appointed deacon and pastor of St. Peter's church, where he was long noted as an eloquent and faithful preacher. He was persuaded by Dr. Zimmerman (who had often been struck with his physiognomical remarks) to reduce into a systematic form his notions on that subject; in consequence of which, he published his first volume on physiognomy in 1776, and two other volumes followed after no very long interval. This work contains a wonderful assemblage of curious observations, delicate feeling, and philanthropic sentiment, with a great number of engravings highly finished and singularly expressive. It was well translated into the English and other modern languages, and was for some time the favourite topic of literary discussion. Lavater also published Aphorisms on Man, and the Journal of a Self-observer; both of which exhibit much originality of sentiment and expression, with deep and philosophical views of human nature.

Lavater was zealously attached to the christian religion, and translated Bonnet's Enquiry into the Evidences of Christianity into the German language. This book he dedicated to the celebrated Jewish philosopher Moses Mendelsohm, with a challenge either to refute it publicly, or profess his conviction of the truth of its arguments. His popularity at Zurich was extremely great; and well he deserved it, as his zeal for doing good was hardly ever surpassed. His genuine love of liberty caused him to be a great admirer of the French revolution; but as he had not a head so stupid as to derive no advantage from experience, nor a heart so hard as to be untouched by the rapine, plunder, and bloodshed, which afterwards disgraced that revolution, he then became one of its most decided antagonists. He was wounded in the breast when Zurich was stormed by Massena in 1799; and never thoroughly recovered from it: he lived, however, till January 1801; and retained his activity and vigour of mind till within a few days of his death.

LAVATERA. Mallow tree. In botany, a genus of the class monadelphia, order polyandria. Calyx double, the outermost three-cleft; capsules numerous, one-seeded, disposed in a ring. Twelve species; natives of the Levant and south of Europe; one common to the sea-rocks of our own country. Of these some have shrubby and some herbaceous stems. Many of these are cultivated in our own gardens, and may be easily propagated by seeds.

The season for sowing is March, and they should be sown upon a bed of fresh light earth. When the plants are come up let them be cleared from weeds, and in very dry weather be refreshed with water; when about two inches high, they should be transplanted to the places in which they are designed to remain. In transplanting them, care should be taken to preserve a ball of earth around their roots; they should be watered and shaded till they have taken new root, after which they will require no other care than to clear them from weeds, and support them by stakes, to prevent their being injured by strong winds. The seeds of these plants may also be sown in autumn, and when the plants are come up, let them be transplanted into small pots, which, toward the end of October, should be placed in a common hot-bed frame, where the plants being defended from severe frosts will continue through the winter without injury. These in the spring may be transferred to larger pots, or even to the open ground where they are designed to flower; and by this management they will be stronger, larger, and flower earlier, than if not sown till the spring.

LAVA'TION. *s.* (*lavatio*, Latin.) The act of washing (*Hakewill*).

LA'VATORY. *s.* (from *lavo*, Lat.) A wash; something in which parts diseased are washed (*Harvey*).

LAUBACH, a handsome and strong town of Germany, in the circle of Austria, and in Carniola, with a bishop's see, a castle, and very handsome houses. It is seated on a river of the same name, wherein are the largest craw-fish in Europe. Lon. 14. 25 E. Lat. 46. 24 N.

LAUD. *s.* (*laus*, Lat.) 1. Praise; honour paid; celebration (*Pope*). 2. That part of divine worship which consists in praise (*Bacon*).

To Laud. *v. a.* (*laudo*, Lat.) To praise; to celebrate (*Bentley*).

Laud (William), archbishop of Canterbury, the son of a clothier of Reading, in Berkshire, was born on the 7th of October, 1573, and educated at Oxford. In 1600 he was ordained deacon, and in 1601 priest. In 1603 he was chosen proctor of the university of Oxford, and the same year made chaplain to Charles Blount, earl of Devonshire. In 1607 he was inducted into the vicarage of Stanford in Northamptonshire, and in the following year had North-Kilworth, in Leicestershire, given him. In 1608 he took the degree of doctor of divinity, and the same year was made chaplain to Dr. Richard Neal, bishop of Rochester. After several other preferments, he was in 1620 made prebendary of Westminster, and the next year bishop of St. David's. In 1626 he was translated to the see of Bath and Wells, and made dean of the royal chapel; and next year privy-counsellor to his majesty. In 1628 he was translated to the see of London; and in 1630 elected chancellor of Oxford. From this time he made it his business to adorn that university, and beginning with St. John's college where he was educated, built all the inner quadrangle, except a part of the south side. He then erected that elegant pile of building at the west end of the divinity school, in which is the convocation-house, and Selden's library. He also gave the university, at several times, one thousand three hundred manuscripts in various languages, which he

had purchased at a prodigious expence. After the murder of the duke of Buckingham, Dr. Laud became chief favourite to king Charles I. which whilst it augmented his power and interest, increased the envy and hatred he had raised against him. The superstitious ceremonies he used in the consecration of St. Catherine Cree church, London, the 6th of January, 1630-1, gave great disgust; and his zeal in the prosecutions carried on in the high commission and star-chamber courts, against authors, printers, and divines, filled the minds of the people with resentment. But the prosecution of the king's printers, for leaving out the word *not* in the seventh commandment, in an edition of the English bible, gave great offence. In 1633 he attended the king into Scotland, and was sworn a privy counsellor for that kingdom. During his stay in Scotland, he formed the resolution of bringing that church to an exact conformity with the church of England. In the same year he succeeded archbishop Abbot in the see of Canterbury. In 1634, and the following year, the archbishop, by his vicar-general, preformed his metropolitical visitation, in which among other things, the church-wardens in every parish were enjoined to remove the communion table from the middle to the east end of the chancel, altar-wise, the ground being raised for that purpose, and to fence it with proper rails. On the 5th of February, 1634-5, he was put into the great committee of trade, and the king's revenue; on the 4th of March following, appointed one of the commissioners of the treasury; and on the 6th of March, 1635-6, he received the staff of lord high-treasurer of England. A new parliament being summoned, met the 13th of April, 1640, and the convocation the day following: but the commons launching out into complaints against the archishop, and insisting upon a redress of grievances before they granted any supply, the parliament was dissolved the 7th of May. The convocation, however, continued sitting, and made seventeen canons, which were supposed to be formed under the immediate direction of the archbishop. In the beginning of the long parliament he was attacked on account of those canons, and they being condemned by the house of commons on the 16th of December, 1640, "as containing many things contrary to the king's prerogative, to the fundamental laws and statutes of this realm, to the rights of parliament, to the property and liberty of the subject, and tending to sedition, and of dangerous consequence," he was, on the 18th of December, accused by the commons of high treason, upon which he was committed to the custody of the usher of the black rod, and on the 1st of March sent to the Tower; and being at length tried before the house of lords, for endeavouring to subvert the laws, and to overthrow the protestant religion, was found guilty, and beheaded on Tower-hill, Friday the 10th of January, 1644-5, in the 72d year of his age. This learned prelate was temperate in his diet, and regular in his private life; but his fondness for introducing new ceremonies, in which he shewed a hot and indiscreet zeal, his encouraging sports on Sundays, his illegality and severity in the star-chamber and high-commission courts, and the fury with which he persecuted the dissenters, and all who presumed to contradict his sentiments, exposed him to popular hatred. Though he was charged with a design to introduce popery, his answer to Dr. Fisher was one of the best ever printed against that religion.

LA'UDABLE. *a.* (*laudabilis*, Latin.) 1. Praiseworthy; commendable (*Locke*). 2. Healthy; salubrious (*Arbuthnot*).

LA'UDABLENESS. *s.* (from *laudable.*) Praiseworthiness.

LA'UDABLY. *ad.* (from *laudable.*) In a manner deserving praise (*Dryden*).

LAUDAMIA, in fabulous history, a daughter of Alexander, king of Epirus, and Olympias, daughter of Pyrrhus, killed in a temple of Diana, by the enraged populace. (*Justin*).

LAUDANUM. (from *laudo*, Lat.) A name commonly given to the tincture of opium, on account of its deserved praise as a specific, or at least, as an extenuant, in a great variety of cases. See Tinctura opii.

LAUDER, a borough in Berwickshire, with a castle, 22 miles S. of Edinburgh. Lon. 3. 5 W. Lat. 55. 36 N.

LAUDI, or Lodi. The name formerly given to certain sacred or spiritual songs of Italian invention, distinct from the hymn, and composed in the praise of God, the Virgin Mary, and the saints and martyrs.

LAUDICŒNI, amongst the Romans, applauders, who for reward entered the rehearsal-rooms, attended the repetition of plays, and were in waiting when orations were pronounced, in order to raise or increase the acclamation and applause.

LAUDOHN (Field-marshal), a celebrated general in the Imperial service, born in 1716, was a native of Livonia, and descended from a Scottish family. He made his first campaigns under marshal Munich, in the war of 1738 between the Russians and Turks; and was at the taking of Oczakow, Choczim, and Stawutzchane, where the Turks were entirely defeated. Frederick the Great refused, in 1741, to take young Laudohn into his service, saying he did not like his countenance; though this monarch, who was considered as the greatest general of his age, afterwards said, that he often admired the positions of other generals, but that he had ever dreaded the battles of Laudohn. In 1756, when but just entered into the service of the house of Austria, with the rank of lieutenant-colonel, he made such a rapid progress, that within less than a year he was general of artillery, and within three years commander in chief of the whole army. He rescued Olmutz, when besieged by the Prussians; beat the king himself at Frankfort on the Oder; at Zondorf, took general Fouquet prisoner; carried Glatz and Schweidnitz by assault; and stopped the progress of Frederick in a war which might have proved fatal to the

house of Austria. In 1778, when elevated to the rank of marshal, at the head of 60,000 men he hindered Henry, brother to the king of Prussia, from joining his army to that of the king. At Dubicza, Novi, Gradisca, and Belgrade, in the late war between the emperor and the Turks, he had but to present himself before the place, and say with Cæsar, *Veni, vidi, vici.* But at his head-quarters in Moravia he was seized with a fever, in consequence of an operation he underwent for an obstruction in the urethra. His impatience under the medical applications, the impetuous ardour of his character, and the knowledge, above all, of his importance in the war, contributed to irritate his mind, and promote the violence of the fever. He resisted the application of cataplasms, before and after the incisions were made, with a fatal obstinacy, which raised the inflammation to such a height, that he expired under the accession of the fever on the 14th of July, 1790, in the 74th year of his age.

LAUDS, Laudes, the second part of the ordinary office of the breviary, said after matins; though, heretofore, it ended the office of the night. The laudes consist principally of psalms, hymns, &c. whence they took their name, from *laus, laudis*, praise.

To LAVE. *v. a.* (*lavo*, Lat.) 1. To wash; to bathe (*Dryden*). 2. (*lever*, Fr.) To throw up; to lade; to draw out (*Ben Jonson*).

To Lave. *v. n.* To wash himself; to bathe (*Pope*).

To LAVE'ER. *v. n.* To change the direction often in a course (*Dryden*).

LAVENDER, in botany. See Lavandula.

Lavender (Cotton). See Santalina.

Lavender (Sea.) See Statice.

LAVENHAM, or Lanham, 61 miles from London, is a pleasant and pretty large town of Suffolk, on a branch of the river Bret, from whence it rises gradually to the top of a hill, where are its church, which is a very handsome Gothic structure, and in which are several ancient monuments; and a spacious market-place, encompassed with nine streets or divisions, in a very healthy free air. It had formerly a very considerable trade in blue cloth; and had three guilds or companies, with each their hall. It has still a considerable manufactory of serges, shalloons, says, stuffs, and spinning fine yarn for London; and many hundred loads of wool are delivered in a year from its wool-hall. It is governed by six capital burgesses, who are for life, and choose the inferior officers. The church and its steeple, which is 137 feet high, are reckoned the finest in the county. Its tenor bell, though not much more than a ton, has as deep a note as a bell of twice that weight. Here is a free-school and a bridewell; and here the tenure of land called Borough English exists. Lon. 0. 51 E. Lat. 52. 39 N.

LAVER, in botany. See Ulva.

Laver, in scripture history, a sacred utensil placed in the court of the Jewish tabernacle, consisting of a bason, whence they drew water by cocks, for washing the hands and feet of the officiating priests, and also the entrails and legs of the victims.

LAVERNA, in antiquity, the goddess of thieves and cheats among the Romans, who honoured her with public worship.

LAUGE'RIA. In botany, a genus of the class pentandria, order monogynia. Corol five-cleft; drupe with a five-celled nut. Five species: native shrubs of America or the West Indies. The several species vary much in the number of cells their nuts contain.

To LAUGH. *v. n.* (hlahan, Sax. *lachen*, German.) 1. To make that noise which sudden merriment excites (*Bacon*). 2. (In poetry.) To appear gay, favourable, pleasant, or fertile (*Shakspeare*). 3. *To* Laugh *at.* To treat with contempt; to ridicule (*Shakspeare*).

To Laugh. *v. a.* To deride; to scorn (*Shakspeare*).

Laugh. *s.* (from the verb.) The convulsion caused by merriment; an inarticulate expression of sudden merriment (*Pope*).

LA'UGHABLE. *a.* (from *laugh.*) Such as may properly excite laughter (*Dryden*).

LA'UGHER. *s.* (from *laugh.*) A man fond of merriment (*Pope*).

LA'UGHINGLY. *ad.* (from *laughing.*) In a merry way; merrily.

LAU'GHINGSTOCK. *s.* (*laugh* and *stock.*) A butt; an object of ridicule (*Spenser*).

LA'UGHTER. *s.* (from *laugh.*) Convulsive merriment; an inarticulate expression of sudden merriment (*Shakspeare*).

LAUINGEN, a town of Suabia, formerly imperial, but now subject to the duke of Neuberg. It is seated on the Danube, 32 miles N.W. of Augsburg. Lon. 10. 25 E. Lat. 48. 38 N.

LAVINGTON, a town in Wilts, with a market on Wednesday, 20 miles N.W. of Salisbury, and 88 W. by S. of London. Lon. 2. 3 W. Lat. 51. 13 N.

LAVINIA, a daughter of king Latinus and Amata, was betrothed to her relation king Turnus, but because the oracle ordered her father to marry her to a foreign prince, she was given to Æneas after the death of Turnus. (See Latinus.) At her husband's death she was left pregnant, and being fearful of the tyranny of Ascanius, her step-son, she fled into the woods, where she brought forth a son called Æneas Sylvius.

LAVIPEDIUM, in medicine, a pediluvium or feet-bath.

LA'VISH. *a.* (from to *lave*, to *throw out.*) 1. Prodigal; wasteful; indiscreetly liberal (*Rowe*). 2. Scattered in waste; profuse. 3. Wild; unrestrained (*Shakspeare*).

To La'vish. *v. a.* (from the adjective.) To scatter with profusion; to waste (*Add.*).

LA'VISHER. *s.* (from *lavish.*) A prodigal; a profuse man.

LA'VISHLY. *ad.* (from *lavish.*) Profusely; prodigally (*Shakspeare*).

LA'VISHMENT. La'vishness. s.

(from *lavish.*) Prodigality; profusion (*Spenser*).

LAUNCE, or SEA LAUNCE. In ichthyology. Ammodytes; by mistake, however, misprinted *ammorytes* in the preceding part of this work, and arranged accordingly.

LAUNCESTON, a borough in Cornwall, with a market on Saturday. It is the county-town, governed by a mayor, and sends two members to parliament. It had a strong castle, which is now in ruins; and a little without the town stands the old priory. It is seated on a hill, near the river Tamar, 28 miles N. of Plymouth, and 214 W. by S. of London. Lon. 4. 35 W. Lat. 50. 40 N.

To LAUNCH. *v. n.* 1. To force a vessel into the sea (*Locke*). 2. To rove at large; to expatiate; to make excursions (*Davies*).

To LAUNCH. *v. a.* 1. To push to sea (*Pope*). 2. To dart from the hand; to lanch (*Dryden*).

LAUNCH, among sailors, a sort of boat used by the French, Italian, and Spanish ships; and is peculiar to those which are employed in the Mediterranean trade, being better fitted for the ports of that sea than a long-boat, than which it is generally much longer, and more flat-bottomed, and also sharper before.

LAUNCHING A SHIP OR BOAT, pushing them into the water from an ascent.

When the ships of the ancients, particularly those of Greece, were launched, they were ornamented with garlands and flowers; the mariners also adorned with crowns, who shouted with loud acclamations, and other expressions of mirth and joy; and being purified by a priest, with a lighted torch, and egg and brimstone, or after some other manner, were consecrated to the god whose image they bore. In the launching of ships now-a-days, the same or similar expressions of joy and feasting are used, colours are displayed, and sometimes music performed.

LAUND. *s.* (*lande*, Fr.) Lawn; a plain extended between woods (*Shakspeare*).

LAUNDER, in mineralogy, a name given in Devonshire, and other places, to a long and shallow trough, which receives the powdered ore after it comes out of the box, or coffer, which is a sort of mortar, in which it is powdered with iron pestles.

The powdered ore, which is washed into the launder by the water from the coffer, is always finest nearest the grate, and coarser all the way down.

LAU'NDRESS. *s.* (*lavandiere*, French.) A woman whose employment is to wash clothes (*Camden*).

LA'UNDRY. *s.* (as if *lavanderie.*) 1. The room in which clothes are washed (*Swift*). 2. The act or state of washing (*Bacon*).

LAVOISIER (Antoine Laurent), was born in Paris on the 26th of August 1743. His father, who directed his education, was opulent, and spared no cost for his improvement. The youth shewed a decided taste for the physical sciences. In 1764, government having proposed an extraordinary premium for the best and cheapest mode of lighting the streets of a large city, Lavoisier obtained the gold medal; and his memoir, full of nice investigation, was printed by the Academy. Into that body he was received on the 13th May 1768, in spite of a formidable opposition; and to its service he ever after devoted his labours, and became one of its most useful associates and coadjutors.

His attention was successively occupied with every branch of physical and mathematical science. The pretended conversion of water into earth, the analysis of gypsum in the neighbourhood of Paris, the crystallization of salts, the effects produced by the *grande de loupe* of the garden of the Infanta, the project of bringing water from l'Yvette to Paris, the congelation of water, and the phenomena of thunder and the aurora borealis—all occupied his attention.

Journeys, undertaken in concert with Guettard into every district of France, enabled him to procure numberless materials towards a description of the lithological and mineralogical empire; these he arranged into a kind of chart, which wanted little of being completed. They served also as a foundation for a more laborious work of his on the revolutions of the globe, and the formation of *Couches de la Terre*; a work of which two beautiful sketches are to be seen in the Memoirs of the French Academy for 1772 and 1787. All the fortune and all the time of Lavoisier were devoted to the culture of the sciences; nor did he seem to have a preponderating inclination for any one in particular, until an event, such as seldom occurs in the annals of the human mind, decided his choice, and attached him thenceforth exclusively to chemistry; a pursuit which has since rendered his name immortal.

The important discovery of gases was just announced to the philosophical world. Black, Priestley, Scheele, Cavendish, and Macbride, had opened to physiologists a sort of new creation; they had commenced a new era in the annals of genius, which was to become equally memorable with those of the compass, printing, electricity, &c.

It was about the year 1770 that Lavoisier, struck with the importance and grandeur of this discovery, turned his attention to this inexhaustible fountain of truths, and instantly perceived, by a kind of instinct, the glorious career which lay before him, and the influence which this new science would necessarily have over the whole train of physical researches. Of those who had preceded him, the most indefatigable experimenter was Priestley: but facts the most brilliant remained frequently unproductive in his hands; on every occasion he was ready to frame some crude hypothesis, which as hastily he abandoned. Lavoisier was imbued with the true spirit of inductive philosophy; his observations, eminently precise and luminous, always pointed to general views. In 1774, he published his chemical opuscules, which contained a very neat history of all that had been done with respect to gases, and con-

cluded with the author's capital experiments, by which it was proved, that metals in calcination derive their augmentation of weight from the absorption of air. Soon afterward, he shewed, in opposition to Priestley, that nitrous acid is composed of air; a remark, of which the importance appeared in the sequel. His ingenuity as a chemist was now so well known, that in 1776 Turgot employed him to inspect the manufacture of gunpowder. He introduced some valuable improvements, and, suppressing the odious visits in quest of the materials of saltpetre, he yet quintupled its produce. The gunpowder would now carry 120 toises, when formerly it would not reach 90. This superiority was indeed acknowledged in the last war.

It had been alleged, that by frequent distillation water is converted into earth. This question Lavoisier resolved in 1778, having shewn that the earthy sediment was owing to the continual erosion of the internal surface of the retort. In that same year he made a more interesting discovery; namely, that the respirable portion of the atmosphere is a constituent principle of all acids, and which he therefore denominated oxygen; a most important fact, and the first great step towards the new chemistry; which the composition of water, ascertained in 1783, triumphantly completed.

Lavoisier possessed decisive advantages over his contemporaries; he studied a geometrical accuracy of investigation; and his wealth enabled him to make experiments on a large scale, and to use instruments of the most perfect construction. He was able to hold in his house, twice every week, assemblies, to which he invited every literary character that was most celebrated in geometrical, physical, and chemical studies; in these instructive *conversationes*, discussions, not unlike such as preceded the first establishment of academies, regularly took place. Here the opinions of the most eminent literati in Europe were canvassed; passages the most striking and novel, out of foreign writers, were recited and animadverted on; and theories were compared with experiments. Here learned men of all nations found easy admission; Priestley, Fontana, Blagden, Ingenhousz, Landriani, Jacquin, Watt, Bolton, and other illustrious physiologists and chemists of England, Germany, and Italy, found themselves mixed in the same company with La Place, La Grange, Borda, Cousin, Meunier, Vandermonde, Monge, Morveau, and Berthollet. Happy hours passed in these learned interviews, wherein no subject was left uninvestigated that could possibly contribute to the progress of the sciences, and the amelioration and happiness of man. One of the greatest benefits resulting from these assemblages, and the influence of which was soon afterwards felt in the academy itself, and consequently in all the physical and chemical works that have been published for the last twenty years in France, was the agreement established in the methods of reasoning between the natural philosophers and the geometricians. The precision, the severity of style, the philosophical method of the latter, was insensibly transfused into the minds of the former; the philosophers became disciplined in the tactics of the geometricians, and were gradually moulded into their resemblance.

It was in the assemblage of these talents that Lavoisier embellished and improved his own. When any new result from some important experiment presented itself, a result which threatened to influence the whole theory of the science, or which contradicted theories till then adopted, he repeated it before this select society. Many times successively he invited the severest objections of his critical friends; and it was not till after he had surmounted their objections, to the conviction and entire persuasion of the society; it was not till after he had removed from it all mystery and obscurity, that he ventured to announce to the world any discovery of his own.

At length he combined his philosophical views into a consistent body, which he published in 1789, under the title of Elements of Chemistry; a book which is a most beautiful model of scientific composition, clear, logical, and elegant. It would be foreign to our purpose to attempt an exposition of the principles, or to expatiate on the merits, of this celebrated system; which, within the space of a very few years, has been almost universally adopted, and which, though it must unavoidably be much shaken by the recent splendid discoveries of Mr. Davy, is still a monument of genius.

The last, but not the least useful, of Lavoisier's philosophical researches, on the Perspiration of Animals, was read to the Academy on the 4th May 1791, and of which part was published in the volume for 1790. He found, by some delicate experiments, made in conjunction with Seguin, that a man in 24 hours perspires 45 ounces; that he consumes 33 ounces of vital air; that he discharges from the lungs 8 cubic feet of carbonic acid gass, of which one-third is carbon and two-thirds are oxygen; that the weight of water discharged from the lungs amounts to 23 ounces, of which 3 are hydrogen and 20 oxygen, exclusive of 6 ounces of water already formed, lost in pulmonary perspiration. These discoveries were directed to the improvement of medicine.

We have mentioned the assistance which Lavoisier received while he was digesting his new system of chemistry; but we must add, that to him pertains exclusively the honour of a founder. His own genius was his sole conductor, and the talents of his associates were chiefly useful in illustrating discoveries he himself had made; he first traced the plan of the revolution he had been a long time conceiving; and his colleagues had only to pursue and execute his ideas.

In the twenty volumes of the Academy of Sciences, from 1772 to 1793, are 40 memoirs of Lavoisier, replete with all the grand phenomena of the science; the doctrine of combustion, general and particular; the nature and analysis of atmospherical air; the formation and fixation of elastic fluids; the properties of

the matter of heat; the composition of acids; the augmentation of the ponderosity of burnt bodies; the decomposition and recomposition of water; the dissolution of metals; vegetation, fermentation, and animalization. For more than 15 years consecutive, Lavoisier pursued, with unshaken constancy, the rout he had marked out for himself, without making a single false step, or suffering his ardour to be damped by the numerous and increasing obstacles which constantly beset him.

Many were the services rendered by Lavoisier, in a public and private capacity, to manufactures, to the sciences, and to artists. He was treasurer to the academy after Buffon and Tillet, and introduced economy and order into the accounts. He was also a member of the Board of Consultation, and took an active share in whatever was going forwards. When the new sysem of measures was agitated, and it was proposed to determine a degree of the meridian, he made accurate experiments on the expansion of metals, and constructed a metalline thermometer. By the National Convention he was consulted on the means of improving the manufacture of assignats, and of increasing the difficulties of forging them.

Like a good citizen, Lavoisier turned his thoughts to political economy. Between the years 1778 and 1785, he allotted 240 arpents in the Vendômois to experimental agriculture, and increased the usual produce by one-half. In 1791, he was invited by the Constituent Assembly to digest a plan for simplifying the collection of the taxes. This gave occasion to an excellent report, afterwards printed with the title of Territorial Riches of France. At this time, also, he was appointed commissioner of the national treasury, in which he effected some beneficial reforms.

During the horrors of the Robespierrean dictatorship, Lavoisier told La Lande that he foresaw he should be stripped of his property, but that he would work for his bread. The profession of apothecary would have suited him the best. But his doom was already fixed. On the 8th of May 1794, confounded with 28 farmers-general, he suffered on the scaffold, being declared guilty of having "adulterated *snuff* with water and ingredients destructive of the health of the citizens!!" He requested time to complete some experiments necessary for an important discovery in which he had been some time engaged; and offered to lay down his life willingly when he had finished his task. The reply of Coffinhal, the president was "that the republic did not want savans or chemists, and that the course of justice could not be suspended!"

Lavoisier was tall, and of a graceful, sprightly appearance. He was mild, sociable, obliging, and extremely active; and in his manners he was unaffectedly plain and simple. Many young men, not blessed with the gifts of fortune, but incited by their genius to woo the sciences, have confessed their obligations to him for pecuniary aid; many, also were the unfortunate whom he relieved in silence, and without the ostentation of virtue. In the communes of the department of the Loir and Char, where he possessed considerable estates, he would frequently visit the cottages of indigence and distress; and long will his memory be cherished there. But his reputation, influence, virtues, and wealth, gave him a great preponderance, which unfortunately provoked the jealousy of a crew of homicides, who made a sport of sacrificing the lives of the best of men to a sanguinary idol.

This great and good man, married, in 1771, Marie-Anni-Pierette Paulze, daughter of a farmer-general; a woman whose wit and accomplishments constituted the charm of his life; who assisted him in his labours, and even engraved the figures of his last work. Since the death of Lavoisier, she has married another philosopher, Count Rumford.

LAVOISIERIAN THEORY. The modern or pneumatic theory of chemistry, so denominated from its illustrious inventor, and which erected itself upon the ruins of the Stahlian or phlogistic theory. See the article CHEMISTRY.

LAVONIA. In botany, a genus of the class syngenesia, order polygamia æqualis. Receptacle naked; down three-awned, glandular at the top; calyx ovate, somewhat imbricate. Two species: one a native of Jamaica, one of Ceylon.

LAVO'LTA. *s.* (*la volte*, French.) An old dance, in which was much turning and much capering (*Shakspeare*).

LAVORO (Terra di), a province of Naples, 63 miles in length, and 35 in breadth; bounded on the W. by Campagna di Roma, on the N. by Abruzzo Ulteriore and Citeriore, on the E. by the Molise and Principato Ulteriore, and on the S. by Principato Citeriore. It is proper for tillage, whence it took its name; and it is fertile in excellent vines and fruits. There are also mineral springs, and mines of sulphur. Naples is the capital.

LAURA, Λαυρα, primarily signifying village, street, or hamlet, a name given to the residences of the ancient monks. Authors cannot agree about the difference between a laura and a monastery: some pretend, that a laura was a monastery, wherein there lived at least a thousand monks; but this is in no-wise credible. The more natural opinion is, that the ancient monasteries were the same with the modern, consisting of large buildings, divided into halls, chapels, and cells, possessed by the monks, each of whom had his apartment; but the lauræ were a kind of villages, whereof each house was inhabited by one or two monks at the most; so that the houses of the Chartreux seem, in some measure, to represent the ancient lauræ, and those of the other monks proper monasteries. The term laura was only understood of the religious places in Egypt, and the East, where their houses stood apart from each other, and were not joined by any common cloister, the monks that inhabited them only meeting in public once a week.

LAUREATE or POET LAUREATE, an of-

ficer of the household of the kings of Britain, whose business consists only in composing an ode annually on his majesty's birth-day, and on the new year; sometimes also, though rarely, on occasion of any remarkable victory. Of the first institution of poets laureate, Mr. Wharton has given the following account in his History of English Poetry. "Great confusion has entered into this subject, on account of the degrees in grammar, which included rhetoric and versification, anciently taken in our universities, particularly at Oxford: on which occasion, a wreath of laurel was presented to the new graduate, who was afterwards styled *Poeta Laureatus*. These scholastic laureations, however, seem to have given rise to the appellation in question. I will give some instances at Oxford, which at the same time will explain the nature of the studies for which our academical philologists received their rewards. About the year 1470, one John Watson, a student in grammar, obtained a concession to be graduated and laureated in that science, on condition that he composed one hundred Latin verses in praise of the university, and a Latin comedy. Another grammarian was distinguished with the same badge, after having stipulated, that, at the next public act, he would affix the same number of hexameters on the great gates of St. Mary's church, that they might be seen by the whole university. This was at that period the most convenient mode of publication. About the same time, one Maurice Byrchensaw, a scholar in rhetoric, supplicated to be admitted to read lectures, that is, to take a degree in that faculty; and his petition was granted, with a provision that he should write one hundred verses on the glory of the university, and not suffer Ovid's Art of Love, and the Elegies of Pamphylus, to be studied in auditory. Not long afterwards, one John Bulman, another rhetorician, having complied with the terms imposed, of explaining the first book of Tully's Offices, and likewise the first of his Epistles, without any pecuniary emolument, was graduated in rhetoric; and a crown of laurel was publicly placed on his head by the hands of the chancellor of the university. Robert Whittington affords the last instance of a rhetorical degree at Oxford, He was a secular priest, and eminent for his various treatises in grammar, and for his facility in Latin poetry: having exercised his art many years, and submitting to the customary demand of an hundred verses, he was honoured with the laurel in the year 1512.

"With regard to the poet laureate of the kings of England, he is undoubtedly the same that is styled the *king's versifier*, and to whom 100 shillings were paid as his annual stipend in the year 1251. But when or how that title commenced, and whether this officer was ever solemnly crowned with laurel at his first investiture, I will not pretend to determine, after the rersearches of the learned Selden on this question have proved unsuccessful. It seems most probable, that the barbarous and inglorious name of *versifier* gradually gave way to an appellation of more elegance and dignity: or rather, that at length those only were in general invited to this appointment, who had received academical sanction, and had merited a crown of laurel in the universities for their abilities in Latin composition, particularly Latin versification. Thus the king's laureate was nothing more than 'a graduated rhetorician employed in the service of the king.' That he originally wrote in Latin, appears from the ancient title *versificator*; and may be moreover collected from the two Latin poems, which Baston and Gulielmus, who appear to have respectively acted in the capacity of royal poets to Richard I. and Edward II. officially composed on Richard's crusade, and Edward's siege of Striveling castle."

On this subject, Fuller (in his Worthies of England, c. x. p. 27.) makes the following observation: "As for our English poets, some have assumed unto themselves the title of laureat, as John Kay, in his dedication of The Siege of Rhodes to King Edward the Fourth, subscribing himself his humble poet laureat. Others have, in compliment, given the title to such persons as were eminent in that faculty; and nothing is more usual than to see their pictures before their books, and statues on their tombs, ornamented accordingly. However, all this is done by civil courtesy, or common custom; no ceremonious creation in court or university."

So early as the thirteenth century, Henry d'Avranches, a Frenchman (Henricus Abrincensis), was entertained by our Henry III. as a poet attached to his court; and under the title of Master Henry the versifier, received from that monarch an annual stipend, which seems to have been ten pounds a-year.

In the 36th year of the same king's reign (1252), forty shillings a-year and a pipe of wine were granted to Rickard, the king's harper; which perhaps gave rise, at a subsequent period, to a similar bounty to the poet laureat.

Gulielmus Peregrinus, who composed a poem on the crusade of Richard I. appears to have been the royal poet of that time; and Robert Baston, whom Ball calls *poeta Oxonii laureatus*, and whom Edward II. carried with him to the siege of Stirling-castle, to record his Scottish exploits in verse, may be considered as exercising the same office under that monarch. Of these versifiers, as they were then called, the compositions produced in their character of poets laureat were in Latin.

Chaucer, perhaps in the time of Edward III. and Richard II. as a poet, and as receiving a royal pension, not without a due allowance of sack; and in the time of Henry IV. Henry Scogan, master of arts, who, if we may credit Ben Jonson, made disguises for the king's sons, and wrote in fine tinkling rhyme and flowand verse; may with sufficient propriety be enrolled in the same tuneful and honourable band: yet neither these poets nor Gower, though two of them were afterwards enumerated in Dryden's patent, as having worn the laurel, were ever regularly and expressly appointed to

this office; nor does the title of poet laureat occur earlier than the time of Edward IV., to whom Jon Kay (Caius), about the year 1470, dedicating a prose translation of a Latin history of the Siege of Rhodes, styles himself *hys humble poete lauriate*. None of his poetry, however either in Latin or English, is known to be extant.

Andrew Bernard, a Frenchman, and an Augustine monk, who was blind, was successively poet laureat and historiographer to Henry VII. and Henry VIII. and was living in 1522.

In 1489, John Skelton was laureated as a rhetorician at Oxford, and a few years afterwards was permitted to wear the laurel publicly at Cambridge. Previously to which he had been honoured by Henry VII. with a grant to wear either some peculiar dress, or some additional ornament on his ordinary apparel. That he was poet laureat to Henry VIII. may be presumed from the titles of some of his works, but there is not sufficient proof of his ever having received an annual salary, which is a criterion for forming a conjecture, at least, concerning the possession of the office, for none of the persons who may be considered as filling the station before Dryden, except Andrew Bernard, are expressly denominated poets laureate in any authentic record.

Thomas Churchyard, a voluminous poetaster in the time of Queen Elizabeth, in consequence of having addressed many of the noblemen of her court for near 40 years, in such rhymes as he could spin, is called by one of his contemporaries the old court poet; this has given rise to a conjecture that he was peculiarly countenanced and patronised by the queen, and formally placed at the head of the poetical band of that time; but, undoubtedly, Elizabeth had no poet laureate till in February, 1590-1, she conferred on Edmund Spenser a pension of 50l. a-year; from which time to his death in 1598-9, he may properly be considered as filling the office, though not expressly styled Laureat in his patent.

Samuel Daniel has been represented by Anthony Wood, and others, as the next successor to the laurel, but he never was thus honoured; for from the death of Spenser to the year 1616 the poetical throne was vacant, though in that period Daniel, Jonson, Dekker, and others, furnished the court with pageants and masques, and may, during that interval, be considered as volunteer laureats. About four months before the death of Shakspeare, January 1, 1615-16, King James granted to Ben Jonson a pension of one hundred marks a-year (66l. 13s. 4d.) during his life, "in consideration of his good and acceptable services past and future:" a grant which invested him with all the dignity and functions of poet laureat. This consideration, however, is common to many other crown grants not conferred on poets; nor did any patent expressly mention the duty and peculiar services expected from a poet laureat, before that of Charles I. to the same person; in which the character and functions of this office are, for the first time, specifically pointed out. On the 23d of April, 1630, that king, "in consideration of good and acceptable services done by the said Benjamin Jonson, and especially to encourage him to proceed in those services of his wit and pen which we have enjoined unto him, and which we expect from him," was pleased to augment his annuity of one hundred marks to one hundred pounds per annum, during life, payable from the preceding Christmas. Old Ben had not long before been struck with the palsy, on which account, perhaps, as well as to gratify his well-known propensity, his majesty, by the same instrument, granted him a tierce of Canary wine yearly, during his life, out of the royal cellars at Whitehall.

It has been generally supposed that Sir William d'Avenant succeeded to the bays immediately on Jonson's death, in August, 1637; but he then received no favour from the crown. About sixteen months afterwards, December, 13, 1638, letters patent passed the great seal, granting an annuity of one hundred pounds a-year to the said William d'Avenant, during his majesty's pleasure. By this patent no Canary-wine was given, nor is any mention made of the office of poet laureat, or the duties belonging to it.

In 1670, some time after the death of Sir William d'Avenant, Dryden, was made poet laureat by letters patent, and held the office till he was compelled to forego it in consequence of the revolution.

On the 29th of August, 1689, he was succeeded by Shadwell.

Shadwell's successor was Nahum Tate, December 23d, 1692, with an annual pension of one hundred pounds, and a butt of Canary wine.

On the death of Tate, 1716, the laurel was given to Rowe; who dying in December, 1718, the Rev. Laurence Eusden was, in the following year, invested with this office.

On the death of Eusden, September 27, 1730, Colley Cibber was appointed poet laureat. His reign extended to the end of the year 1757.

To him succeeded William Whitehead, who dying April 14, 1785, the Rev. Thomas Warton obtained the laurel, which he held for five years.

Shortly after his death, which happened May 21, 1790, Henry James Pye, esq. was appointed poet laureat, and now fills the poetical throne.

There is no grant in the chapel of the rolls, constituting Rowe poet laureat. The practice of conferring this office by a warrant signed and sealed by the lord chamberlain, nominating A. B. to the office, with the accustomed fees thereunto belonging, then commenced, and has prevailed from that time to the present.

LA'UREATE. *a.* (*laureatus*, Lat.) Decked or invested with a laurel (*Pope*).

LAUREA'TION. *s.* (from *laureate.*) In the Scottish universities, the act or state of

having degrees conferred, as they have in some of them a flowery crown, in imitation of laurel among the ancients. See LAUREATE.

LAUREL, in botany. See LAURUS, and PRUNUS.

LAUREL (American). See KALMIA.

LAUREL (Cherry). See LAURO CERASUS.

LAUREL (Alexandrian), in botany. See RUSCUS.

LAUREL OF AMERICA (Dwarf). See KALMIA.

LAUREL (flax-leaved). See DAPHNE.

LAUREL (Sea-side). See PHYLLANTHUS.

LAUREL (Spurge). See DAPHNE.

LA'URELED. *a.* (from *laurel.*) Crowned or decorated with laurel; laureate (*Dryden*).

LAURENS CASTRA. See LAURENTUM.

LAURENTALIA, certain festivals celebrated at Rome in honour of Laurentia, in the calends of January.

LAURENTINI, the inhabitants of Latium, so called from *laurus*, a laurel, because king Latinus found one of uncommon largeness and beauty, when he was going to build a emple to Apollo. The tree was consecrated to the god. (*Virg.*)

LAURENTIUS, one of the first printers, and, according to some, the inventor of the art, was born at Haerlem about the year 1370, and executed several departments of magistracy of that city. Those writers are mistaken who assign to him the surname of Costor, or assert that the office of æditnus was hereditary in his family. In a diploma of Albert of Bavaria in 1380, in which, among other citizens of Haerlem, our Laurentius's father is mentioned by the name of Joannes Laurentii filius, Beroldus is called ædituus, who was surely of another family; and in 1396 and 1398, Henricus a Lunen enjoyed that office; after whose resignation, count Albert conferring on the citizens the privilege of electing their ædituus, they, probably soon after, fixed on Laurentius; who was afterwards called Coster from his office, and not from his family name, as he was descended from an illegitimate branch of the Gens Brederodia. His office was very lucrative; and that he was a man of great property, the elegance of his house may testify. That he was the inventor of printing, is asserted in the narrative of Junius. His first work was an Horarium, containing the Letters of the alphabet, the Lord's prayer, the Apostle's creed, and two or three short prayers; the next was the Speculum salutis, in which he introduced pictures on wooden blocks; then Donatus, the larger size; and afterwards the same work in a less size. All these were printed on separate moveable wooden types fastened together by threads.

LAURENTUM, the capital of the ancient kingdom of Latium in the reign of Latinus.

LAUREOLA, (*laureola*, dim. of *laurus*, the laurel, named from its resemblance to the laurel.) Spurge laurel. The bark of this plant, daphne laureola of Linnéus, is recommended to excite a discharge from the skin, in the same way as that of thymelæa.

LAURINGEN, a town of Germany, in the bishopric of Wurtzburg, 24 miles N.W. of Bamberg, and 30 N.E. of Wurtzburg. Lon. 10. 21 E. Lat. 50. 5 N.

LAURO-CERASUS, (*lauro-cerasus*, from *laurus*, the laurel, and *cerasus*, the cherry tree, so called because it has leaves like the laurel). Common or cherry laurel. Prunus lauro-cerasus of Linnéus. P. floribus racemosis foliis semper virentibus dorso biglandulosis. Class icosandria. Order monogynia. The leaves of the lauro-cerasus have a bitter styptic taste, accompanied with a flavour resembling that of bitter almonds, or other kernels of the drupacious fruits: the flowers also manifest a similar flavour. The powdered leaves applied to the nostrils excite sneezing, though not so strongly as tobacco. The kernel-like flavour which these leaves impart being generally esteemed grateful, has sometimes induced them to be employed for culinary purposes, and especially in custards, puddings, blancmange, &c.; and as the proportion of this sapid matter of the leaf to the quantity of the milk is commonly inconsiderable, bad effects have seldom ensued. But as the poisonous quality of this laurel is now indubitably proved, the public ought to be cautioned against its internal use. See PRUNUS.

The following communication to the Royal Society, by Dr. Madden of Dublin, contains the first and principal proofs of the deleterious effects of this vegetable upon mankind:—"A very extraordinary accident that fell out here some months ago, has discovered to us a most dangerous poison, which was never before known to be so, though it has been in frequent use among us. The thing I mean is a simple water, distilled from the leaves of the lauro-cerasus; the water is at first milky, but the oil which comes over the helm with it, being in a good measure separated from the phlegm, by passing it through a flannel bag it becomes as clear as common water. It has the smell of bitter almonds, or peach kernel, and has been for many years in frequent use among our housewives and cooks, to give that agreeable flavour to their creams and puddings. It has also been much in use among our drinkers of drams; and the proportions they generally use it in has been one part of laurel-water to four of brandy. Nor has this practice, however frequent, ever been attended with any apparent ill consequences, till some time in the month of September 1728, when it happened, that one Martha Boyse, a servant, who lived with a person that sold great quantities of this water, got a bottle of it from her mistress, and gave it to her mother. Ann Boyse made a present of it to Frances Eaton, her sister, who was a shopkeeper in town, and who she thought might oblige her customers with it. Accordingly, in a few days, she gave about two ounces to a woman called Mary Whaley, who drank about two thirds of what was filled out,

and went away. Francis Eaton drank the rest. In a quarter of an hour after Mary Whaley had drank the water (as I am informed), she complained of a violent disorder in her stomach, soon after lost her speech, and died in about an hour, without vomiting or purging, or any convulsion. The shopkeeper, F. Eaton, sent word to her sister, Ann Boyse, of what had happened, who came to her upon the message, and affirmed that it was not possible the cordial (as she called it) could have occasioned the death of the woman; and, to convince her of it, she filled out about three ounces, and drank it. She continued talking with F. Eaton about two minutes longer, and was so earnest to persuade her of the liquor's being inoffensive, that she drank about two spoonfuls more, but was hardly well seated in her chair, when she died without the least groan or convulsion. Frances Eaton, who, as before observed, had drank somewhat more than a spoonful, found no disorder in her stomach or elsewhere; but, to prevent any ill consequences, she took a vomit immediately, and has been well ever since."—Dr. Madden mentions another case, of a gentleman at Kilkenny, who mistook a bottle of laurel-water for a bottle of ptisan. What quantity he drank is uncertain, but he died in a few minutes, complaining of a violent disorder in his stomach. In addition to this, we may refer to the unfortunate case of Sir Theodosius Boughton, whose death, in 1780, an English jury declared to be occasioned by this poison. In this case, the active principle of the lauro-cerasus was concentrated by repeated distillations, and given to the quantity of one ounce, the suddenly fatal effects of which must be still in the recollection of the public. To brute animals this poison is almost instantaneously mortal, as amply appears by the experiments of Madden, Mortimer, Nicholls, Fontana, Langrish, Vater, and others. The experiments conducted by these gentlemen shew that the laurel-water is destructive to animal life, not only when taken into the stomach, but also on being injected into the intestines, or applied externally to different organs of the body. It is remarked by Abbe Fontana, that this poison, even "when applied in a very small quantity, to the eyes, or to the inner part of the mouth, without touching the œsopagus, or being carried into the stomach, is capable of killing an animal in a few minutes: whilst applied in a much greater quantity to wounds, it has so little activity, that the weakest animals, such as pigeons, resist its action."

The most volatile is the most active part of the lauro-cerasus; and if we judge from its sensible qualities, an analogous principle seems to pervade many other vegetable substances, especially the kernels of drupaceous fruits; and in various species of the amygdalus, this sapid principle extends to the flowers and leaves. It is of importance to notice, that this is much less powerful in its action upon human subjects than upon dogs, rabbits, pigeons, and reptiles. To poison man, the essential oil of the lauro-cerasus must be separated by distillation, as in the spirituous or common laurel-water; and unless this is strongly embued with the oil, or given in a large dose, it proves innocent. Dr. Cullen observes, that the sedative power of the lauro-cerasus acts upon the nervous system in a different manner from opium and other narcotic substances, whose primary action is upon the animal functions; for the lauro-cerasus does not occasion sleep, nor does it produce local inflammation, but seems to act directly upon the vital powers. Abbe Fontana supposes that this poison destroys animal life, by exerting its effects upon the blood; but the experiments and observations from which he draws this opinion are evidently inconclusive. It may also be remarked, that many of the Abbe's experiments contradict each other. Thus, it appears from the citation given above, that the poison of this vegetable, when applied to wounds does not prove fatal; but future experiments led the Abbe to assert, that the oil of the lauro-cerasus, "whether given internally, or applied to the wounds of animals, is one of the most terrible and deadly poisons known." Though this vegetable seems to have escaped the notice of Stoerck, yet it is not without advocates for its medical use. Linnéus informs us, that in Switzerland it is commonly and successfully used in pulmonary complaints. Langrish mentions its efficacy in agues; and as Bergius found bitter almonds to have this effect, we may by analogy conclude, that this power of the lauro-cerasus is well established. Baylies found, that it possessed a remarkable power of diluting the blood, and from experience, recommended it in all cases of disease supposed to proceed from too dense a state of that fluid; adducing particular instances of its efficacy in rheumatism, asthmas, and in schirrous affections. Nor does this author seem to have been much afraid of the deletereous quality of lauro-cerasus, as he directs a pound of its leaves to be macerated in a pint of water, of which he gives from 30 to 60 drops, three or four times a day.

LAURUS, (*Laurus*, *i*, & *ûs*, f. from *laus*, praise, because it was usual to crown the heads of eminent men with branches of it). Bay. In botany, a genus of the class enneandria, order monogynia. Calyxless; corol six-parted, resembling a calyx; nectary three glands surrounding the germ, and each ending in two bristles; inner filaments supporting two glands each; drupe one-seeded. Thirty-four species; chiefly natives of the East and West Indies, or South America; one or two of the south of Europe. The following are the chief.

1. L. nobilis. Sweet bay. Leaves lanceolate, veined, perennial; flowers four-cleft, diœcous. There are four or five varieties from a difference of the leaf, which is broad, striped, narrow, or wavy.

2. L. Cinnamomum. Cinnamon-tree. Leaves three-nerved, ovate, oblong; the nerves disappearing towards the tip. The tree is covered with a smooth bark; the flowers are panicled. The liber or inner bark of the branches constitutes the cinnamon of the shops. The trunk of the tree grows to the height of twenty or thirty feet. It is a native of Ceylon. For the rest see Cinnamon.

3. L. Cassia. Wild Cinnamon. Cassia lignea-tree. Leaves triply nerved, lanceolate. Its fruit is the Cassia-lignea of the dispensatories. It is a native of Malabar. See Cassia-lignea.

4. L. Camphora. Camphor-tree. Leaves triply-nerved; lance-ovate, whitish underneath: flowers on long peduncles, white, and consisting of six petals, each producing a shining purple berry of the size of a pear, but top-shaped. It is a native of the woods of Japan, and exudes an inspissated resinous secretion, which is the Camphor of the shops. See Camphor.

5. L. Persea. Alligator pear-tree. Leaves ovate, coriaceous, transversely veined, perennial; flower corymbed, of a dirty-white, or yellow colour, with an agreeable odour, diffusing itself to a considerable distance. The branches of this tree are soft and succulent; its fruit is of the size and shape of a large pear, and has a delicious and grateful flavour. It is a native of the West Indies.

6. L. Benzoin. Benjamin-tree. Leaves nerveless, ovate, acute, at both ends, entire, annual, veined underneath: stamens from six to nine; flowers yellow, not succeeded by berries in this country. The tree is a native of Virginia, rising from fifteen to twenty feet. It is sometimes confounded with the true *Benzoin-tree*, which is the Styrax Benzoin. See Styrax.

7. L. Sassafras. Sassafras-tree. Leaves entire, three-lobed, downy underneath, from three to six inches long, with small yellowish flowers succeeded by black berries in its native country, which is Virginia. The wood affords the Sassafras of the shops.

8. L. Caustica. Leaves oval, wrinkled, perennial, reticulate with veins: flowers yellow and four-cleft. A poisonous tree of Chili.

9. L. Æstivalis. Deciduous Bay. Leaves veined, oblong, pointed, annual, wrinkled underneath; branches superaxillary. A native of Virginia, with small white flowers succeeded by red berries.

10. L. Indica. Indian bay. Leaves veined, lanceolate, perennial, flat; branchlets tubercled with scars; flowers racemed: trunk upright, from twenty to thirty feet high, branching regularly; flowers whitish-green, succeeded in its native soil by large oval black berries. A native of Madeira.

The leaves and berries of L. nobilis, which is a native of Italy, but cultivated in our own gardens, possess various medicinal qualities, has a sweet fragrant smell, and an aromatic adstringent taste. The laurus of honorary memory, the distinguished favourite of Apollo, may be naturally supposed to have had no inconsiderable fame as a medicine; but its pharmaceutic uses are so limited in the practice of the present day, that this dignified plant is now rarely employed, except in the way of enema, or as an external application; thus, in the old London pharmacopoeia, the leaves are directed in the *decoctum pro fomento*, and the berries in the *emplastrum cumini*. A preparation which is confirmed in the new edition.

LAURUSTINUS, in botany. See Viburnum.

LAUS, in ancient geography, a river of Italy, separating Lucania from the Bruttii, and running from east to west into the Tuscan sea. This river is now called Laino.

Laus Perennis. (Lat.) The name given by papistical writers to the perpetual psalmody preserved at Antioch by an order of monks established there in the early ages of Christianity, and whose discipline obliged them to render it equally perennial with the vestal fire, or perpetual lamps of antiquity.

LAUSANNE, an ancient town of Swisserland, capital of the Pays de Vaud, with a famous college, and a bishop's see. It contains 7000 inhabitants. It is built on such a steep ascent, that, in some places, the horses cannot, without great difficulty, draw up a carriage; and foot-passengers ascend to the upper part of the town by steps. Its lofty situation affords the most sublime views in nature, commanding the lake of Geneva, the Pays de Vaud, and the rugged coast of Chablais. The church, the town-house, and other public buildings, are magnificent. It is seated between three hills, 30 miles N.E. of Geneva, and 50 S. W. of Bern. Lon. 6. 50. E. lat. 46. 31. N.

LAUSHRANT, in botany, a species of Delphinium, which see.

LAUSUS, son of Numitor, and brother of Ilia. He was put to death by his uncle Amulius, who usurped his father's throne. (*Ovid*).—A son of Mezentius, king of the Tyrrhenians, killed by Æneas in the war which his father and Turnus made against the Trojans.

LAUTERBRUNN, a village of Swisserland, six miles S. of Interlaken. It is seated in a valley of the same name, celebrated for its picturesque and romantic scenery. See Staubbach.

LAUTERBURG, a town of Western Prussia, in the palatinate of Culm, 50 miles N. E. of Thorn.

Lauterburg, a town of Germany, in the

circle of Upper Rhine, but subject to the French. It is 10 miles S. E. of Weissemburg. Lon. 8. 26. E. lat. 48. 48. N.

LAUTERECK, a town of Germany, in the circle of Upper Rhine, and county of Veldenz, situate on the Glan, 24 miles N. of Deux Ponts, and 46 S. of Coblentz. Lon. 7. 17. E. lat. 49. 39. N.

LAUZERTE, a town of France, in the departments of Lot and Garonne, 15 miles N. E. of Marmande. Lon. 0. 22. E. lat. 44. 38. N.

LAW. *s.* (laga, Saxon.) 1. A rule of action (*Dryden*). 3. A decree, edict, statute, or custom, publicly established (*Davies*). 3. Judicial process (*Shakspeare*). 4. Conformity to law; any thing lawful (*Shakspeare*). 5. An established and constant mode or process (*Shakspeare*). 6. The Mosaical institution: distinguished from the *prophets*, and the *gospel*. 7. Jurisprudence; the study of law.

Law, in its most general and comprehensive sense, signifies a rule of action (as above defined); and is applied indiscriminately to all kinds of action, whether animate or inanimate, rational or irrational. Thus we say, the laws of motion, of gravitation, of optics, of mechanics, as well as the laws of nature and of nations. And it is that rule of action which is preserved by some superior, and which the inferior is bound to obey.

Thus when the Supreme Being formed the universe, and created matter out of nothing, he impressed certain principles upon that matter, from which it can never depart, and without which it would cease to be. When he put that matter into motion, he established certain laws of motion, to which all moveable bodies conform. And, to descend from the greatest operations to the smallest, when a workman forms a clock, or other piece of mechanism, he establishes at his own pleasure, certain arbitrary laws for its direction; to which, so long as it conforms, it continues in perfection, and answers the end of its formation.

If we advance farther from mere inactive matter to vegetable and animal life, we shall find them still governed by laws; more numerous indeed, but equally fixed and invariable. The whole progress of plants, from the seed to the root, and from thence to the seed again; the method of animal nutrition, digestion, secretion, and all other branches of vital economy;—are not left to chance, or the will of the creature itself, but are performed in a wondrous involuntary manner, and guided by unerring rules laid down by the great Creator.

This then is the general signification of law, a rule of action dictated by some superior being: and, in those creatures that have neither the power to think nor to will, such laws must be invariably obeyed, so long as the creature itself subsists: for its existence depends on that obedience. But laws, in their more confined sense, and in which it is our present business to consider them, denote the rules, not of action in general, but of human action or conduct: that is, the precepts by which man, the noblest of all sublunary beings, a creature endowed with both reason and free-will, is commanded to make use of those faculties in the general regulation of his behaviour.

Man, considered as a creature, must necessarily be subject to the laws of his Creator, for he is entirely a dependent being. A being independent of any other has no rule to pursue but such as he prescribes to himself: but a state of dependance will inevitably oblige the inferior to take the will of him on whom he depends as the rule of his conduct; not indeed in every particular, but in all those points wherein his dependance consists. This principle therefore has more or less extent and effect, in proportion as the superiority of the one and the dependance of the other is greater or less, absolute or limited. And consequently, as man depends absolutely upon his Maker for every thing, it is necessary that he should in all points conform to his Maker's will.

This will of his Maker is called the law of nature. For as God, when he created matter, and endued it with a principle of mobility, established certain rules for the perpetual direction of that motion; so, when he created man, and endued him with free-will to conduct himself in all parts of life, he laid down certain immutable laws of human nature, whereby that free-will is in some degree regulated and restrained, and gave him also the faculty of reason to discover the purport of those laws.

Considering the Creator only as a being of infinite power, he was able unquestionably to have prescribed whatever laws he pleased to his creature man, however unjust or severe. But as he is also a being of infinite wisdom, he has laid down only such laws as were founded in those relations of justice that existed in the nature of things antecedent to any positive precept. These are the eternal immutable laws of good and evil, to which the Creator himself in all his dispensations conforms; and which he has enabled human reason to discover, so far as they are necessary for the conduct of human actions. Such, among others, are these principles: That we should live honestly, should hurt nobody, and should render to every one his due; to which three general precepts Justinian has reduced the whole doctrine of law.

But if the discovery of these first principles of the law of nature depended only upon the due exertion of right reason, and could not otherwise be obtained than by a chain of metaphysical disquisitions, mankind would have wanted some inducement to have quickened their inquiries, and the greater part of the world would have rested content in mental indolence, and ignorance its inseparable companion. As therefore the Creator is a being, not only of infinite power and wisdom, but also of infinite goodness, he has been pleased so to contrive the constitution and frame of humanity, that we should want no other prompter to inquire after and pursue the rule of right, but only our own self-love, that universal principle of action. For he has so intimately connected, so inseparably interwoven, the laws of eternal justice with the happiness of each individual, that the latter cannot be attained but by observing the former; and if the former be punctually obeyed, it cannot but induce the latter. In consequence of which mutual connection of justice and human felicity, he has not perplexed the law of nature with a multitude of abstracted rules and precepts, referring merely to the fitness or unfit-

ness of things, as some have vainly surmised; but has graciously reduced the rule of obedience to this one paternal precept, "that man should pursue his own happiness." This is the foundation of what we call ethics, or natural law. For the several articles into which it is branched in our systems, amount to no more than demonstrating, that this or that action tends to man's real happiness; and therefore very justly concluding, that the performance of it is a part of the law of nature; or, on the other hand, that this or that action is destructive of man's real happiness, and therefore that the law of nature forbids it.

This law of nature, being coëval with mankind, and dictated by God himself, is of course superior in obligation to any other. It is binding over all the globe, in all countries, and at all times: no human laws are of any validity, if contrary to this; and such of them as are valid derive all their force, and all their authority, mediately or immediately, from this original.

But in order to apply this to the particular exigencies of each individual, it is still necessary to have recourse to reason: whose office it is to discover, as was before observed, what the law of nature directs in every circumstance of life; by considering, what method will tend the most effectually to our own substantial happiness. And if our reason were always, as in our first ancestor before his transgression, clear and perfect, unruffled by passions, unclouded by prejudice, unimpaired by disease or intemperance, the task would be pleasant and easy; we should need no other guide but this. But every man now finds the contrary in his own experience; that his reason is corrupt, and his understanding full of ignorance and error.

This has given manifold occasion for the benign interposition of divine providence; which, in compassion to the frailty, the imperfection, and the blindness of human reason, hath been pleased, at sundry times and in divers manners, to discover and enforce its laws by an immediate and direct revelation. The doctrines thus delivered, we call the revealed or divine law, and they are to be found only in the Holy Scriptures. These precepts, when revealed, are found upon comparison to be really a part of the original law of nature, as they tend in all their consequences to man's felicity. But we are not from thence to conclude, that the knowledge of these truths was attainable by reason in its present corrupted state; since we find, that, until they were revealed, they were hid from the wisdom of ages. As then the moral precepts of this law are indeed of the same original with those of the law of nature, so their intrinsic obligation is of equal strength and perpetuity. Yet undoubtedly the revealed law is of infinitely more authenticity than that moral system which is framed by ethical writers, and denominated the natural law: because one is the law of nature, expressly declared so to be by God himself; the other is only what, by the assistance of human reason, we imagine to be that law. If we could be as certain of the latter as we are of the former, both would have an equal authority: but till then they can never be put in any competition together.

Upon these two foundations, the law of nature and the law of revelation, depend all human laws; that is to say, no human laws should be suffered to contradict these. There are, it is true, a great number of indifferent points, in which both the divine law and the natural leave a man at his own liberty; but which are found necessary, for the benefit of society, to be restrained within certain limits. And herein it is that human laws have their greatest force and efficacy; for, with regard to such points as are not indifferent, human laws are only declaratory of, and act in subordination to, the former. To instance in the case of murder: this is expressly forbidden by the divine, and demonstrably by the natural, law; and from these prohibitions arises the true unlawfulness of this crime. Those human laws that annex a punishment to it, do not at all increase its moral guilt, or superadd any fresh obligation in *foro conscientiæ* to abstain from its perpetration. Nay, if any human law should allow or enjoin us to commit it, we are bound to transgress that human law, or else we must offend both the natural and the divine. But with regard to matters that are in themselves indifferent, and are not commanded or forbidden by those superior laws; such, for instance, as exporting of wool into foreign countries; here the inferior legislature has scope and opportunity to interpose, and to make that action unlawful which before was not so.

If man were to live in a state of nature, unconnected with other individuals, there would be no occasion for any other laws than the law of nature and the law of God. Neither could any other law possibly exist: for a law always supposes some superior who is to make it; and in a state of nature we are all equal, without any other superior but him who is the author of our being. But man was formed for society; and, as is demonstrated by the writers on this subject, is neither capable of living alone, nor indeed has the courage to do it. However, as it is impossible for the whole race of mankind to be united in one great society, they must necessarily divide into many; and from separate states, common wealths, and nations, entirely independent of each other, and yet liable to a mutual intercourse. Hence arises a third kind of law to regulate this mutual intercourse, called the law of nations: which, as none of these states will acknowledge a superiority in the other, cannot be dictated by either; but depends entirely upon the rules of natural law, or upon mutual compacts, treatise, leagues, and agreements, between these several communities: in the construction also of which compacts we have no other rule to resort to but the law of nature; being the only one to which both communities are equally subject: and therefore the civil law very justly observes, that *quod naturalis ratio inter omnes homines constituit, vocatur jus gentium*.

To the consideration, then, of the law of nature, the revealed law, and the law of nations, succeeds that of the municipal or civil law; that is, the rule by which particular districts, communities, or nations, are governed; being thus defined by Justinian, "*jus civile est quod quisque sibi populus constituit.*" We call it municipal law, in compliance with common speech; for though, strictly, that expression denotes the particular customs of one single municipium or free town, yet it may with sufficient propriety be applied to any one state or nation which is governed by the same laws and customs.

Municipal law, thus understood, is properly defined to be "a rule of civil conduct prescribed by the supreme power in a state, commanding what is right, and prohibiting what is wrong." Let us endeavour to explain its several properties, as they arise out of this definition.

And, first, it is a rule: not a transient sudden order from a superior to or concerning a particular person; but something permanent, uniform, and universal. Therefore a particular act of the legislature to confiscate the goods of Titius, or to attaint him of high treason, does not enter into the ideas of a municipal law: for the operation of this act is spent upon Titius only, and has no relation to the community in general; it is rather a sentence than a law. But an act to declare that the crime of which Titius is accused shall be deemed high treason; this has permanency, uniformity, and universality, and therefore is properly a rule. It is also called a rule, to distinguish it from advice or counsel, which we are at liberty to follow or not as we see proper, and to judge upon the reasonableness or unreasonableness of the thing advised: whereas our obedience to the law depends not upon our approbation, but upon the maker's will. Counsel is only matter of persuasion, law is matter of injunction; counsel acts only upon the willing, law upon the unwilling also.

It is also called a rule, to distinguish it from a compact or agreement; for a compact is a promise proceeding from us, law is a command directed to us. The language of a compact is, "I will, or will not, do this;" that of a law is, "Thou shalt, or shalt not, do it." It is true there is an obligation which a compact carries with it, equal in point of conscience to that of a law: but then the original of the obligation is different. In compacts, we ourselves determine and promise what shall be done, before we are obliged to do it: in laws, we are obliged to act without ourselves determining or promising any thing at all. Upon these accounts law is defined to be "a rule."

Municipal law is also "a rule of civil conduct." This distinguishes municipal law from the natural or revealed: the former of which is the rule of moral conduct; the latter, not only the rule of moral conduct, but also of faith. These regard man as a creature; and point out his duty to God, to himself, and to his neighbour, considered in the light of an individual. But municipal or civil law regards him also as a citizen, and bound to other duties towards his neighbour than those of mere nature and religion: duties, which he has engaged in by enjoying the benefits of the common union; and which amount to no more, than that he do contribute, on his part, to the subsistence and peace of the society.

It is likewise "a rule prescribed." Because a bare resolution, confined in the breast of the legislator, without manifesting itself by some external sign, can never be properly a law. It is requisite that this resolution be notified to the people who are to obey it. But the manner in which this notification is to be made, is matter of very great indifference. It may be notified by universal tradition and long practice, which supposes a previous publication, and is the case of the common law of England and of Scotland. It may be notified *viva voce*, by officers appointed for that purpose; as is done with regard to proclamations, and such acts of parliament as are appointed to be publicly read in churches and other assemblies. It may, lastly, be notified by writing, printing, or the like; which is the general course taken with all our acts of parliament. Yet, whatever way is made use of, it is incumbent on the promulgators to do it in the most public and perspicuous manner; not like Caligula, who (according to Dio Cassius) wrote his laws in a very small character, and hung them up upon high pillars, the more effectually to ensnare the people. There is still a more unreasonable method than this, which is called making of laws *ex post facto*; when, after an action (indifferent in itself) is committed, the legislator then for the first time declares it to have been a crime, and inflicts a punishment upon the person who has committed it. Here it is impossible that the party could foresee that an action, innocent when it was done, should be afterwards converted to guilt by a subsequent law: he had therefore no cause to abstain from it; and all punishment for not abstaining must of consequence be cruel and unjust. All laws should be therefore made to commence *in futuro*, and be notified before their commencement; which is implied in the term "prescribed." But when this rule is in the usual manner notified or prescribed, it is then the subject's business to be thoroughly acquainted therewith; for if ignorance of what he might know were admitted as a legitimate excuse, the laws would be of no effect, but might always be eluded with impunity.

But further: Municipal law is "a rule of civil conduct prescribed by the supreme power in a state." For legislature, as was before observed, is the greatest act of superiority that can be exercised by one being over another. Wherefore it is requisite to the very essence of a law, that it be made by the supreme power. Sovereignty and legislature are indeed convertible terms; one cannot subsist without the other.

This will naturally lead us into a short inquiry concerning the nature of society and civil government; and the natural inherent right that belongs to the sovereignty of a state, wherever that sovereignty be lodged, of making and enforcing laws.

The only true and natural foundations of society are the wants and fears of individuals. Not that we can believe, with some theoretical writers, that there ever was a time when there was no such thing as society; and that, from the impulse of reason, and through a sense of their wants and weaknesses, individuals met together in a large plain, entered into an original contract, and chose the tallest man present to be their governor. This notion, of an actually existing unconnected state of nature, is too wild to be seriously admitted; and besides, it is plainly contradictory to the revealed accounts of the primitive origin of mankind, and their preservation 2000 years afterwards; both which were effected by the means of single families. These formed the first society among themselves, which every day extended its limits; and when it grew too large to subsist with convenience in that pastoral state wherein the patriarchs appear to have lived, it necessarily subdivided itself by various migrations into more. Afterwards, as agriculture increased, which employs and can maintain a much greater number of hands, migrations became less frequent; and various tribes, which had formerly separated, reunited again; some-

times by compulsion and conquest, sometimes by accident, and sometimes perhaps by compact. But though society had not its formal beginning from any convention of individuals, actuated by their wants and their fears; yet it is the sense of their weakness and imperfection that keeps mankind together; that demonstrates the necessity of this union; and that therefore is the solid and natural foundation, as well as the cement, of society. And this is what we mean by the original contract of society; which, though perhaps in no instance it has ever been formally expressed at the first institution of a state, yet in nature and reason must always be understood and implied in the very act of associating together: namely, that the whole should protect all its parts, and that every part should pay obedience to the will of the whole; or, in other words, that the community should guard the rights of each individual member, and that (in return for this protection) each individual should submit to the laws of the community; without which submission of all, it was impossible that protection could be certainly extended to any.

For when society is once formed, government results of course, as necessary to preserve and to keep that society in order. Unless some superior be constituted, whose commands and decisions all the members are bound to obey, they would still remain as in a state of nature, without any judge upon earth to define their several rights, and redress their several wrongs. But as all the members of society are naturally equal, it may be asked, In whose hands are the reins of government to be entrusted? To this the general answer is easy; but the application of it to particular cases has occasioned one half of those mischiefs which are apt to proceed from misguided political zeal. In general, all mankind will agree, that government should be reposed in such persons, in whom those qualities are most likely to be found, the perfection of which is among the attributes of him who is emphatically styled the Supreme Being; the three grand requisites, namely, of wisdom, of goodness, and of power: wisdom, to discern the real interest of the community; goodness, to endeavour always to pursue that real interest; and strength or power, to carry this knowledge and intention into action. These are the natural foundations of sovereignty, and these are the requisites that ought to be found in every well constituted frame of government.

How the several forms of government we now see in the world at first actually began, is matter of great uncertainty, and has occasioned infinite disputes. It is not our business or intention to enter into any of them. However they began, or by what right soever they subsist, there is and must be in all of them a supreme, irresistible, absolute, uncontrolled authority, in which the *jura summi imperii*, or the rights of sovereignty, reside. And this authority is placed in those hands, wherein (according to the opinion of the founders of such respective states, either impressly given or collected from their tacit approbation) the qualities requisite for supremacy, wisdom, goodness, and power, are the most likely to be found.

The political writers of antiquity will not allow more than three regular forms of government: the first, when the sovereign power is lodged in an aggregate assembly consisting of all the members of a community, which is called a democracy; the second, when it is lodged in a council composed of select members, and then it is styled an aristocracy; the last, when it is entrusted in the hands of a single person, and then it takes the name of a monarchy. All other species of government, they say, are either corruptions of, or reducible to, these three.

By the sovereign power, as was before observed, is meant the making of laws; for wherever that power resides, all others must conform to and be directed by it, whatever appearance the outward form and administration of the government may put on. For it is at any time in the option of the legislature to alter that form and administration by a new edict or rule, and to put the execution of the laws into whatever hands it pleases: and all the other powers of the state must obey the legislative power in the execution of their several functions, or else the constitution is at an end.

In a democracy, where the right of making laws resides in the people at large, public virtue or goodness of intention is more likely to be found than either of the other qualities of government. Popular assemblies are frequently foolish in their contrivance, and weak in their execution; but generally mean to do the thing that is right and just, and have always a degree of patriotism or public spirit. In aristocracies there is more wisdom to be found than in the other forms of government; being composed, or intended to be composed, of the most experienced citizens: but there is less honesty than in a republic, and less strength than in a monarchy. A monarchy is indeed the most powerful of any, all the sinews of government being knit and united together in the hand of the prince; but then there is imminent danger of his employing that strength to improvident or oppressive purposes.

Thus these three species of government have all of them their several perfections and imperfections. Democracies are usually the best calculated to direct the end of a law; aristocracies, to invent the means by which that end shall be obtained; and monarchies, to carry those means into execution. And the ancients, as was observed, had in general no idea of any other permanent form of government but these three: for though Cicero declares himself of opinion, "esse optime constitutam rempublicam, quæ ex tribus generibus illis, regali, optimo, et populari, sit modice confusa;" yet Tacitus treats this notion of a mixed government, formed out of them all, and partaking of the advantages of each, as a visionary whim, and one that, if effected, could never be lasting or secure.

But, happily for us of this island, the British constitution has long remained, and we trust will long continue, a standing exception to the truth of this observation. For, as with us the executive power of the laws is lodged in a single person, they have all the advantages of strength and dispatch that are to be found in the most absolute monarchy: and, as the legislature of the kingdom is entrusted to three distinct powers, entirely independent of each other; first, the king; secondly, the lords spiritual and temporal, which is an aristocratical assembly of persons selected for their piety, their birth, their wisdom, their valour, or their property; and, thirdly, the house of commons, freely chosen by the people from among themselves, which

makes it a kind of democracy; as this aggregate body, actuated by different springs, and attentive to different interests, composes the British parliament, and has the supreme disposal of every thing, there can no inconvenience be attempted by either of the three branches, but will be withstood by one of the other two, each branch being armed with a negative power sufficient to repel any innovation which it shall think inexpedient or dangerous.

Here, then, is lodged the sovereignty of the British constitution; and lodged as beneficially as is possible for society. For in no other shape could we be so certain of finding the three great qualities of government so well and so happily united. If the supreme power were lodged in any one of the three branches separately, we must be exposed to the inconveniencies of either absolute monarchy, aristocracy, or democracy; and so want two of the three principal ingredients of good polity, either virtue, wisdom, or power. If it were lodged in any two of the branches; for instance, in the king and house of lords; our laws might be providentally made and well executed, but they might not always have the good of the people in view: if lodged in the king and commons, we should want that circumspection and mediatory caution, which the wisdom of the peers is to afford: if the supreme rights of legislature were lodged in the two houses only, and the king had no negative upon their proceedings, they might be tempted to encroach upon the royal prerogative, or perhaps to abolish the kingly office, and thereby weaken (if not totally destroy) the strength of the executive power. But the constitutional government of this island is so admirably tempered and compounded, that nothing can endanger or hurt it, but destroying the equilibrium of power between one branch of the legislature and the rest. For if ever it should happen, that the independence of any one of the three should be lost, or that it should become subservient to the views of either of the other two, there would soon be an end of our constitution. The legislature would be changed from that which was originally set up by the general consent and fundamental act of the society: and such a change, however effected, is, according to Mr. Locke (who perhaps carried his theory too far), at once an entire dissolution of the bands of government; and the people are thereby reduced to a state of anarchy, with liberty to constitute to themselves a new legislative power.

Having thus cursorily considered the three usual species of government, and our own singular constitution selected and compounded from them all, we proceed to observe, that, as the power of making laws constitutes the supreme authority, so wherever the supreme authority in any state resides, it is the right of that authority to make laws; that is, in the words of our definition, to prescribe the rule of civil action. And this may be discovered from the very end and institution of civil states. For a state is a collective body, composed of a multitude of individuals, united for their safety and convenience, and intending to act together as one man. If it therefore is to act as one man, it ought to act by one uniform will. But, inasmuch as political communities are made up of many natural persons, each of whom has his particular will and inclination, these several wills cannot by any natural union be joined together, or tempered and disposed into a lasting harmony, so as to constitute and produce that one uniform will of the whole. It can therefore be no otherwise produced than by a political union; by the consent of all persons to submit their own private wills to the will of one man, or of one or more assemblies of men, to whom the supreme authority is entrusted; and this will of that one man, or assemblage of men, is in different states, according to their different constitutions, understood to be law.

Thus far as to the right of the supreme power to make laws: but farther, it is its duty likewise. For since the respective members are bound to conform themselves to the will of the state, it is expedient that they receive directions from the state declaratory of that its will. But as it is impossible, in so great a multitude, to give injunctions to every particular man, relative to each particular action, therefore the state establishes general rules, for the perpetual information and direction of all persons in all points, whether of positive or negative duty: and this, in order that every man may know what to look upon as his own, what as another's; what absolute and what relative duties are required at his hands; what is to be esteemed honest, dishonest, or indifferent; what degree every man retains of his natural liberty, and what he has given up as the price of the benefits of society; and after what manner each person is to moderate the use and exercise of those rights which the state assigns him, in order to promote and secure the public tranquillity.

From what has been advanced, the truth of the former branch of our definition is (we trust) sufficiently evident; that "municipal law is a rule of civil conduct, prescribed by the supreme power in a state." We proceed now to the latter branch of it; that it is a rule so prescribed, "commanding what is right, and prohibiting what is wrong."

Now, in order to do this completely, it is first of all necessary that the boundaries of right and wrong be established and ascertained by law. And when this is once done, it will follow of course, that it is likewise the business of the law, considered as a rule of civil conduct, to enforce these rights, and to restrain or redress these wrongs. It remains therefore only to consider, in what manner the law is said to ascertain the boundaries of right and wrong; and the methods which it takes to command the one and prohibit the other.

For this purpose, every law may be said to consist of several parts: one, declaratory; whereby the rights to be observed, and the wrongs to be eschewed, are clearly defined and laid down: another, directory; whereby the subject is instructed and enjoined to observe those rights, and to abstain from the commission of those wrongs: a third, remedial; whereby a method is pointed out to recover a man's private rights, or redress his private wrongs: to which may be added a fourth, usually termed the sanction or vindicatory branch of the law; whereby it is signified what evil or penalty shall be incurred by such as commit any public wrongs, and transgress or neglect their duty.

With regard to the first of these, the declaratory part of the municipal law; this depends not so much upon the law of revelation or of nature, as upon the wisdom and the will of the legislator. This doctrine, which before was slightly touched,

deserves a more particular explication. Those rights, then, which God and nature have established, and are therefore called natural rights, such as are life and liberty, need not the aid of human laws to be more effectually invested in every man than they are; neither do they receive any additional strength when declared by the municipal laws to be inviolable. On the contrary, no human legislature has power to abridge or destroy them, unless the owner shall himself commit some act that amounts to a forfeiture. Neither do divine or natural duties (such as, for instance, the worship of God, the maintenance of children, and the like), receive any stronger sanction from being also declared to be duties by the law of the land. The case is the same as to crimes and misdemeanors, that are forbidden by the superior laws, and therefore styled *mala in se*, such as murder, theft, and perjury; which contract no additional turpitude from being declared unlawful by the inferior legislature. For that legislature in all these cases acts only, as was before observed, in subordination to the Great Lawgiver, transcribing and publishing his precepts. So that, upon the whole, the declaratory part of the municipal law has no force or operation at all, with regard to actions that are naturally and intrinsically right or wrong.

But with regard to things in themselves indifferent, the case is entirely altered. These become either right or wrong, just or unjust, duties or misdemeanors, according as the municipal legislator sees proper, for promoting the welfare of the society, and more effectually carrying on the purposes of civil life. Thus our own common law has declared, that the goods of the wife do instantly upon the marriage become the property and right of the husband; and our statute law has declared all monopolies a public offence: yet that right, and this offence, have no foundation in nature; but are merely created by the law, for the purposes of civil society. And sometimes, where the thing itself has its rise from the law of nature, the particular circumstances and mode of doing it become right or wrong, as the laws of the land shall direct. Thus, for instance, in civil duties; obedience to superiors is the doctrine of revealed as well as natural religion: but who those superiors shall be, and in what circumstances, or to what degrees they shall be obeyed, is the province of human laws to determine. And so, as to injuries or crimes, it must be left to our own legislature to decide, in what cases the seizing another's cattle shall amount to the crime of robbery; and where it shall be a justifiable action, as when a landlord takes them by way of distress for rent.

Thus much for the declaratory part of the municipal law: and the directory stands much upon the same footing; for this virtually includes the former, the declaration being usually collected from the direction. The law that says, "Thou shalt not steal," implies a declaration that stealing is a crime. And we have seen, that, in things naturally indifferent, the very essence of right and wrong depends upon the direction of the laws to do or to omit them.

The remedial part of a law is so necessary a consequence of the former two, that laws must be very vague and imperfect without it. For in vain would rights be declared, in vain directed to be observed, if there were no method of recovering and asserting those rights when wrongfully withheld or invaded. This is what we mean properly, when we speak of the protection of the law. When, for instance, the declaratory part of the law has said, "that the field or inheritance which belonged to Titius's father is vested by his death in Titius," and the directory part has "forbidden any one to enter on another's property without the leave of the owner;" if Gaius, after this, will presume to take possession of the land, the remedial part of the law will then interpose its office; will make Gaius restore the possession to Titius, and also pay him damages for the invasion.

With regard to the sanction of laws, or the evil that may attend the breach of public duties; it is observed, that human legislators have for the most part chosen to make the sanction of their laws rather vindicatory than remuneratory, or to consist rather in punishments than in actual particular rewards: because, in the first place, the quiet enjoyment and protection of all our civil rights and liberties, which are the sure and general consequence of obedience to the municipal law, are in themselves the best and most valuable of all rewards: because also, were the exercise of every virtue to be enforced by the proposal of particular rewards, it were impossible for any state to furnish stock enough for so profuse a bounty; and farther, because the dread of evil is a much more forcible principle of human actions than the prospect of good. For which reasons, though a prudent bestowing of rewards is sometimes of exquisite use, yet we find that those civil laws, which enforce and enjoin our duty, do seldom, if ever, propose any privilege or gift to such as obey the law; but do constantly come armed with a penalty denounced against transgressors, either expressly defining the nature and quantity of the punishment, or else leaving it to the discretion of the judges, and those who are intrusted with the care of putting the laws in execution.

Of all the parts of a law the most effectual is the vindicatory. For it is but lost labour to say, "Do this, or avoid that," unless we also declare, "This shall be the consequence of your noncompliance." We must therefore observe, that the main strength and force of a law, consists in the penalty annexed to it. Herein is to be found the principal obligation of human laws.

Legislators and their laws are said to compel and oblige: not that, by any natural violence, they so constrain a man as to render it impossible for him to act otherwise than as they direct, which is the strict sense of obligation; but because, by declaring and exhibiting a penalty against offenders, they bring it to pass that no man can easy choose to transgress the law; since, by reason of the impending correction, compliance is in a high degree preferable to disobedience. And, even where rewards are proposed as well as punishments threatened, the obligation of the law seems chiefly to consist in the penalty: for rewards, in their nature, can only persuade and allure; nothing is compulsory but punishment.

It is true, it hath been holden, and very justly, by the principal of our ethical writers, that human laws are binding upon men's consciences. But if that were the only or most forcible obligation, the good only would regard the laws, and the bad would set them at defiance. And, true as this principle is, it must still be understood with some restriction. It holds, we apprehend, as to rights; and then, when the law has determined the field

to belong to Titius, it is a matter of conscience no longer to withhold or to invade it. So also in regard to natural duties, and such offences as are *mala in se*: here we are bound in conscience, because we are bound by superior laws, before those human laws were in being, to perform the one and abstain from the other. But in relation to those laws which enjoin only positive duties, and forbid only such things as are not *mala in se*, but *mala prohibita* merely, without any intermixture of moral guilt, annexing a penalty to non-compliance; here seems to be conscience no farther concerned, than by directing a submission to the penalty, in case of our breach of these laws: for otherwise the multitude of penal laws in a state would not only be looked upon as an impolitic, but would also be a very wicked thing; if every such law were a snare for the conscience of the subject. But in these cases the alternative is offered to every man; "either abstain from this, or submit to such a penalty:" and his conscience will be clear, whichever side of the alternative he thinks proper to embrace. Thus, by the statutes for preserving the game, a penalty is denounced against every unqualified person that kills a hare, and against every person who possesses a partridge in August. And so too, by other statutes, pecuniary penalties are inflicted for exercising trades without serving an apprenticeship thereto, for erecting cottages without annexing four acres of land to each, for not burying the dead in woollen, for not performing statute-work on the public roads, and for innumerable other positive misdemeanors. Now these prohibitory laws do not make the transgresson a moral offence, or sin: the only obligation in conscience is to submit to the penalty, if levied. It must, however, be observed, that we are here speaking of laws that are simply and purely penal, where the thing forbidden or enjoined is wholly a matter of indifference, and where the penalty inflicted is an adequate compensation for the civil inconvenience supposed to arise from the offence. But where disobedience to the law involves in it also any degree of public mischief or private injury, there it falls within our former distinction, and is also an offence against conscience.

We have now gone through the definition laid down of a municipal law; and have shown that it is "a rule—of civil conduct—prescribed—by the supreme power in a state—commanding what is right, and prohibiting what is wrong:" in the explication of which we have endeavoured to interweave a few useful principles, concerning the nature of civil government, and the obligation of human laws. Before we conclude this part, it may not be amiss to add a few observations concerning the interpretation of laws.

When any doubt arose upon the construction of the Roman laws, the usage was to state the case to the emperor in writing, and take his opinion upon it. This was certainly a bad method of interpretation. To interrogate the legislature to decide particular disputes, is not only endless, but affords great room for partiality and oppression. The answers of the emperor were called his rescripts, and these had in succeeding cases the force of perpetual laws; though they ought to be carefully distinguished by every rational civilian, from those general constitutions which had only the nature of things for their guide. The emperor Macrinus, as his historian Capitolinus informs us, had once resolved to abolish these rescripts, and retain only the general edicts: he could not bear that the hasty and crude answers of such princes as Commodus and Caracalla should be reverenced as laws. But Justinian thought otherwise, and he has preserved them all. In like manner the canon laws, or decretal epistles of the popes, are all of them rescripts in the strictest sense. Contrary to all true forms of reasoning, they argue from particulars to generals.

The fairest and most rational method to interpret the will of the legislator, is by exploring his intentions at the time when the law was made, by signs the most natural and probable. And these signs are either the words, the context, the subject-matter, the effects and consequence, or the spirit and reason of the law. Let us take a short view of them all.

1. Words are generally to be understood in their usual and most known signification; not so much regarding the propriety of grammar, as their general and popular use. Thus the law mentioned by Puffendorff, which forbad a layman to lay hands on a priest, was adjudged to extend to him who had hurt a priest with a weapon. Again: terms of art, or technical terms, must be taken according to the acceptation of the learned in each art, trade and science. So in the act of settlement, where the crown of England is limited "to the princess Sophia, and the heirs of her body being protestants," it becomes necessary to call in the assistance of lawyers, to ascertain the precise idea of the words "heirs of her body;" which in a legal sense comprise only certain of her lineal descendants. Lastly, where words are clearly repugnant in two laws, the latter law takes place of the elder; *leges posteriores priores contrarias abrogant*, is a maxim of universal law, as well as of our own constitution. And accordingly it was laid down by a law of the twelve tables at Rome, *Quod populus postremum jussit, id jus ratum esto.*

2. If words happen to be still dubious, we may establish their meaning from the context; with which it may be of singular use to compare a word or a sentence, whenever they are ambiguous, equivocal, or intricate. Thus the proëme, or preamble, is often called in to help the construction of an act of parliament. Of the same nature and use is the comparison of a law with other laws that are made by the same legislator, that have some affinity with the subject, or that expressly relate to the same point. Thus, when the law of England declares murder to be felony without benefit of clergy, we must resort to the same law of England to learn what the benefit of clergy is: and, when the common law censures simoniacal contracts, it affords great light to the subject to consider what the canon law has adjudged to be simony.

3. As to the subject matter, words are always to be understood as having a regard thereto; for that is always supposed to be in the eye of the legislator, and all his expressions directed to that end. Thus, when a law of Edward III. forbids all ecclesiastical persons to purchase provisions at Rome, it might seem to prohibit the buying of grain and other victual; but when we consider that the statute was made to repress the usurpations of the papal see, and that the nominations to benefices by the pope were called provisions, we shall see that the restraint is intended to be laid upon such provisions only.

4. As to the effects and consequence, the rule is, that where words bear either none, or a very

absurd signification, if literally understood, we must a little deviate from the received sense of them. Therefore the Bolognian law, mentioned by Puffendorf, which enacted, "that whoever drew blood in the streets should be punished with the utmost severity," was held, after long debate, not to extend to the surgeon who opened the vein of a person that fell down in the street with a fit.

5. But, lastly, the most universal and effectual way of discovering the true meaning of a law, when the words are dubious, is by considering the reason and spirit of it, or the cause which moved the legislator to enact it. For when this reason ceases, the law itself ought likewise to cease with it. An instance of this is given in a case put by Cicero, or whoever was the author of the rhetorical treatise inscribed to Herennius. There was a law, that those who in a storm forsook the ship should forfeit all property therein, and the ship and lading should belong entirely to those who staid in it. In a dangerous tempest, all the mariners forsook the ship, except only one sick passenger, who by reason of his disease was unable to get out and escape. By chance the ship came safe to port. The sick man kept possession, and claimed the benefit of the law. Now here all the learned agree, that the sick man is not within the reason of the law; for the reason of making it was, to give encouragement to such as should venture their lives to save the vessel: but this is a merit which he could never pretend to, who neither staid in the ship upon that account, nor contributed any thing to its preservation.

From this method of interpreting laws by the reason of them, arises what we call equity: which is thus defined by Grotius, "the correction of that, wherein the law (by reason of its universality) is deficient." For since in laws all cases cannot be foreseen or expressed, it is necessary, that, when the general decrees of the law come to be applied to particular cases, there should be somewhere a power vested of defining those circumstances, which (had they been foreseen) the legislator himself would have expressed. And these are the cases which, according to Grotius, "lex non exacte definit, sed arbitrio boni viri permittit."

Equity thus depending, essentially, upon the particular circumstances of each individual case, there can be no established rules and fixed precepts of equity laid down, without destroying its very essence, and reducing it to a positive law. And, on the other hand, the liberty of considering all cases in an equitable light must not be indulged too far; lest thereby we destroy all law, and leave the decision of every question entirely in the breast of the judge. And law, without equity, though hard and disagreeable, is much more desirable for the public good, than equity without law; which would make every judge a legislator, and introduce most infinite confusion; as there would then be almost as many different rules of action laid down in our courts, as there are differences of capacity and sentiment in the human mind.

Having thus considered the nature of laws in general, we shall proceed to give a view of the particular law of our own country. The English law, however, being too extensive to admit of detail in a body, we can only here give such a sketch of it as may be sufficient to show the composition of its parts; but the principal of these parts themselves are explained at large, under their proper names, in the general alphabet.

Part II.—*The Law of England.*—The municipal law of England, or the rule of civil conduct prescribed to the inhabitants of that kingdom, may, with sufficient propriety, be divided into two kinds: the *lex non scripta*, the unwritten or common law; and the *lex scripta*, the written or statute law.

The *lex non scripta*, or unwritten law, includes not only general customs, or the common law properly so called; but also the particular customs of certain parts of the kingdom, and likewise those particular laws that are by custom observed only in certain courts and jurisdictions.

In calling these parts of the law *leges non scriptæ*, we would not be understood as if all those laws were at present merely oral, or communicated from the former ages to the present solely by word of mouth. It is true indeed, that in the profound ignorance of letters which formerly overspread the whole western world, all laws were entirely traditional; for this plain reason, that the nations among which they prevailed had but little idea of writing. Thus the British as well as the Gallic druids committed all their laws, as well as learning, to memory; and it is said of the primitive Saxons here, as well as their brethren on the continent, that *leges sola memoria et usu retinebant.* But, with us at present, the monuments and evidences of our legal customs are contained in the records of the several courts of justice, in books of reports and judicial decisions, and in the treatises of learned sages of the profession, preserved and handed down to us from the times of highest antiquity. However, we therefore style these parts of our law *leges non scriptæ*, because their original institution and authority are not set down in writing, as acts of parliament are: but they receive their binding power, and the force of laws, by long and immemorial usage, and by their universal reception throughout the kingdom: in like manner as Aulus Gellius defines the *jus non scriptum* to be that which is *tacito et illiterato hominum consensu et moribus expressum.*

Our ancient lawyers, and particularly Fortescue, insist with abundance of warmth, that these customs are as old as the primitive Britons, and continued down through the several mutations of government and inhabitants, to the present time, unchanged and unadulterated. This may be the case as to some. But in general, as Mr. Selden in his notes observes, this assertion must be understood with many grains of allowance; and ought only to signify, as the truth seems to be, that there never was any formal exchange of one system of laws for another: though doubtless, by the intermixture of adventitious nations, the Romans, the Picts, the Saxons, the Danes, and the Normans, they must have insensibly introduced and incorporated many of their own customs with those that were before established; thereby, in all probability, improving the texture and wisdom of the whole, by the accumulated wisdom of divers particular countries. Our laws, saith Lord Bacon, are mixed as our language; and as our language is so much the richer, the laws are the more complete.

And indeed our antiquarians and first historians do all positively assure us, that our body of laws is of this compounded nature. For they tell us, that in the time of Alfred, the local customs of the several provinces of the kingdom

were grown so various, that he found it expedient to compile his dome-book, or *liber judicialis*, for the general use of the whole kingdom. This book is said to have been extant so late as the reign of Edward IV. but is now unfortunately lost. It contained, we may probably suppose, the principal maxims of the common law, the penalties for misdemeanors, and the forms of judicial proceedings. Thus much may at least be collected from that injunction to observe it, which we find in the laws of King Edward the elder, the son of Alfred. "Omnibus qui reipublicæ præsunt etiam atque etiam mando, ut omnibus æquos se præbeant judices, perinde ac in judiciali libro scriptum habetur: nec quiquam formident quin jus commune audacter libereque dicant."

But the irruption and establishment of the Danes in England, which followed soon after, introduced new customs, and caused this code of Alfred, in many provinces, to fall into disuse, or at least to be mixed and debased with other laws of a coarser alloy. So that, about the beginning of the 11th century there were three principal systems of laws prevailing in different districts. 1. The Mercen Lage, or Mercian laws, which were observed in many of the inland counties, and those bordering on the principality of Wales, the retreat of the ancient Britons; and therefore very probably intermixed with the British or Druidical customs. 2. The West Saxon Lage, or laws of the West Saxons, which obtained in the counties to the south and west of the island, from Kent to Devonshire. These were probably much the same with the laws of Alfred above-mentioued, beiug the municipal law of the far most considerable part of his dominions, and particularly including Berkshire, the seat of his peculiar residence. 3. The Dane Lage, or Danish law, the very name of which speaks its original and composition. This was principally maintained in the rest of the midland counties, and also on the eastern coast, the part most exposed to the visits of that piratical people. As for the very northern provinces, they were at that time under a distinct government.

Out of these three laws, Roger Hoveden and Ranulphus Cestrensis inform us, King Edward the confessor extracted one uniform law, or digest of laws, to be observed throughout the whole kingdom; though Hoveden and the author of an old manuscript chronicle assure us likewise, that this work was projected and begun by his grandfather, King Edgar. And indeed a general digest of the same nature has been constantly found expedient, and therefore put in practice by other great nations, which were formed from an assemblage of little provinces, governed by peculiar customs. As in Portugal, under King Edward, about the beginning of the 15th century. In Spain, under Alonzo X. who about the year 1250, executed the plan of his father, St. Ferdinand, and collected all the provincial customs into one uniform law, in the celebrated code entitled *Las partidas*. And in Sweden, about the same era, a universal body of common law was compiled out of the particular customs established by the laghman of every province, and entitled the *land's lagh*, being analogous to the common law of England.

Both these undertakings of king Edgar and Edward the confessor seem to have been no more than a new edition, or fresh promulgation, of Alfred's code or dome-book, with such additions and improvements as the experience of a century and a half had suggested. For Alfred is generally styled by the same historians the legum Anglicanarum conditor, as Edward the confesssor is the restitutor. These, however, are the laws which our histories so often mention under the name of the laws of Edward the confessor; which our ancestors struggled so hardly to maintain, under the first princes of the Norman line; and which subsequent princes so frequently promised to keep and to restore, as the most popular act they could do, when pressed by foreign emergencies or domestic discontents. These are the laws, that so vigorously withstood the repeated attacks of the civil law, which established in the 12th century a new Roman empire over the most of the states on the continent; states that have lost, perhaps upon that account, their political liberties; while the free constitution of England, perhaps upon the same account, has been rather improved than debased. These, in short, are the laws which gave rise and origin to that collection of maxims and customs which is now known by the name of the common law. A name either given to it, in contradistinction to other laws, as the statute law, the civil law, the law merchant, and the like; or, more probably, as a law common to all the realm, the *jus commune* or *folcritgh*, mentioned by king Edward the elder, after the abolition of the several provincial customs and particular laws beforementioned.

But though this is the most likely foundation of this collection of maxims and customs; yet the maxims and customs, so collected, are of higher antiquity than memory or history can reach: nothing being more difficult than to ascertain the precise beginning and first spring of an ancient and long established custom. Whence it is, that in our law the goodness of a custom depends upon its having been used time out of mind; or, in the solemnity of our legal phrase, time whereof the memory of man runneth not to the contrary. This it is that gives it its weight and authority; and of this nature are the maxims and customs which compose the common law, or *lex non scripta*, of this kingdom.

This unwritten, or common law, is properly distinguishable into three kinds: 1. General customs; which are the universal rule of the whole kingdom, and form the common law in its stricter and more usual signification. 2. Particular customs; which for the most part affect only the inhabitants of particular districts. 3. Certain particular laws; which by custom are adopted and used by some particular courts, of pretty general and extensive jurisdiction.

I. As to general customs, or the common law properly so called; this is that law, by which proceedings and determinations in the king's ordinary courts of justice are guided and directed. This, for the most part, settles the course in which lands descend by inheritance; the manner and form of acquiring and transferring property; the solemnities and obligation of contracts; the rules of expounding wills, deeds, and acts of parliament; the respective remedies of civil injuries; the several species of temporal offences, with the manner and degree of punishment, and an infinite number of minuter particulars, which diffuse themselves as extensively as the ordinary distribution of common justice requires. Thus, for example, that there shall be four superior courts of record, the chancery, the king's bench, the common pleas, and the exchequer;—that the

eldest son alone is heir to his ancestor;—that property may be acquired and transferred by writing;—that a deed is of no validity unless sealed and delivered;—that wills shall be construed more favourably, and deeds more strictly; —that money lent upon bond is recoverable by action for debt;—that breaking the public peace is an offence, and punishable by fine and imprisonment:—all these are doctrines that are not set down in any written statute or ordinance; but depend merely upon immemorial usage, that is, upon common law, for their support.

Some have divided the common law into two principal grounds or foundations: 1. Established customs; such as that, where there are three brothers, the eldest brother shall be heir to the second, in exclusion of the youngest: and, 2. Established rules and maxims; as, "that the king can do no wrong, that no man shall be bound to acuse himself," and the like. But these seem to be one and the same thing. For the authority of these maxims rests entirely upon general reception and usage; and the only method of proving that this or that maxim is a rule of the common law, is by shewing that it hath been always the custom to observe it.

But here a very natural, and very material, question arises: How are these customs or maxims to be known, and by whom is their validity to be determined? The answer is, By the judges in the several courts of justice. They are the depository of the laws; the living oracles who must decide in all cases of doubt, and who are bound by an oath to decide according to the law of the land. Their knowledge of that law is derived from experience and study; from the *viginti annorum lucubrationes*, which Fortescue mentions; and from being long personally accustomed to the judicial decisions of their predecessors. And indeed these judicial decisions are the principal and most authoritative evidence, that can be given, of the existence of such a custom as shall form a part of the common law. The judgment itself, and all the proceedings previous thereto, are carefully registered and preserved under the name of records, in public repositories set apart for that particular purpose; and to them frequent recourse is had, when any critical question arises, in the determination of which former precedents may give light or assistance. And therefore, even so early as the conquest, we find the *præteritorum memoria eventorum* reckoned up as one of the chief qualifications of those who were held to be *legibus patriæ optime instituti*. For it is an established rule, to abide by former precedents, where the same points come again in litigation: as well to keep the scale of justice even and steady, and not liable to waver with every new judge's opinion; as also because the law in that case being solemnly declared and determined, what before was uncertain, and perhaps indifferent, is now become a permanent rule, which it is not in the breast of any subsequent judge to alter or vary from according to his private sentiments: he being sworn to determine, not according to his own private judgment, but according to the known laws and customs of the land; not delegated to pronounce a new law, but to maintain and expound the old one. Yet this rule admits of exception, where the former determination is most evidently contrary to reason; much more if it be contrary to the divine law. But, even in such cases, the subsequent judges do not pretend to make a new law, but to vindicate the old one from misrepresentation. For if it be found that the former decision is manifestly absurd or unjust, it is declared, not that such a sentence was bad law, but that it was not law; that is, that it is not the established custom of the realm, as has been erroneously determined. And hence it is that our lawyers are with justice so copious in their encomiums on the reason of the common law; that they tell us, that the law is the perfection of reason, that it always intends to conform thereto, and that what is not reason is not law. Not that the particular reason of every rule in the law can at this distance of time be always precisely assigned; but it is sufficient that there be nothing in the rule flatly contradictory to reason, and then the law will presume it to be well founded. And it hath been an ancient observation in the laws of England, that whenever a standing rule of law, which the reason perhaps could not be remembered or discerned, hath been wantonly broken in upon by statutes or new resolutions, the wisdom of the rule hath in the end appeared from the inconveniences that have followed the innovation.

The doctrine of the law then is this: That precedents and rules must be followed, unless flatly absurd or unjust: for though their reason be not obvious at first view, yet we owe such a deference to former times, as not to suppose they acted wholly without consideration. To illustrate this doctrine by examples. It has been determined, time out of mind, that a brother of the half blood shall never succeed as heir to the estate of his half brother, but it shall rather escheat to the king, or other superior lord. Now this is a positive law, fixed and established by custom; which custom is evidenced by judicial decisions; and therefore can never be departed from by any modern judge without a breach of his oath and the law. For herein there is nothing repugnant to natural justice; though the artificial reason of it, drawn from the feodal law, may not be quite obvious to every body. And therefore, on account of a supposed hardship upon the half brother, a modern judge might wish it had been otherwise settled; yet it is not in his power to alter it. But if any court were now to determine, that an elder brother of the half blood might enter upon and seize any lands that were purchased by his younger brother, no subsequent judges would scruple to declare that such prior determination was unjust, was unreasonable, and therefore was not law. So that the law, and the opinion of the judge, are not always convertible terms, or one and the same thing; since it sometimes may happen that the judge may mistake the law. Upon the whole, however, we may take it as a general rule, "That the decisions of courts of justice are the evidence of what is common law;" in the same manner as in the civil law, what the emperor had once determined was to serve for a guide for the future.

The decisions therefore of courts are held in the highest regard, and are not only preserved as authentic records in the treasuries of the several courts, but are handed out to public view in the numerous volumes of reports which furnish the lawyer's library. These reports are histories of the several cases, with a short summary of the proceedings, which are preserved at large in the record; the arguments on both sides, and the reasons the court gave for its judgment; taken down in short notes by persons present at the determination. And these serve as indexes to, and

also to explain the records; which always, in matters of consequence and nicety, the judges direct to be searched. The reports are extant in a regular series from the reign of king Edward II. inclusive; and from his time to that of Henry VIII. were taken by the prothonotories, or chief scribes of the court, at the expence of the crown, and published annually, whence they are known under the denomination of the *year-books*. And it is much to be wished that this beneficial custom had, under proper regulations been continued to this day; for though king James I. at the instance of lord Bacon, appointed two reporters, with a handsome stipend, for this purpose; yet that wise institution was soon neglected, and from the reign of Henry VIII. to the present time this task has been executed by many private and cotemporary hands; who sometimes through haste and inaccuracy, sometimes through mistake and want of skill, have published very crude and imperfect (perhaps contradictory) accounts of one and the same determination. Some of the most valuable of the ancient reports are those published by lord chief justice Coke; a man of infinite learning in his profession, though not a little infected with the pedantry and quaintness of the times he lived in, which appear strongly in all his works. However, his writings are so highly esteemed, that they are generally cited without the author's name.

Besides these reporters, there were also other authors, to whom great veneration and respect are paid by the students of the common law. Such are Glanvil and Bracton, Britton and Fleta, Littleton and Fitzherbert, with some others of ancient date, whose treatises are cited as authority; and are evidence that cases have formerly happened in which such and such points were determined, which are now become settled and first principles. One of the last of the methodical writers in point of time, whose works are of any intrinsic authority in the courts of justice, and do not entirely depend on the strength of their quotations from older authors, is the same learned judge we have just mentioned, Sir Edward Coke; who hath written four volumes of Institutes, as he is pleased to call them, though they have little of the institutional method to warrant such a title. The first volume is a very extensive comment upon a little excellent treatise of tenures, compiled by judge Littleton in the reign of Edward IV. This comment is a rich mine of valuable common-law learning, collected and heaped together from the ancient reports and year-books, but greatly defective in method. The second volume is a comment upon many old acts of parliament, without any systematical order: the third, a more methodical treatise of the pleas of the crown; and the fourth, an account of the several species of courts.

And thus much for the first ground and chief corner-stone of the laws of England; which is general immemorial custom, or common law, from time to time declared in the decisions of the courts of justice; which decisions are preserved among the public records, explained in the reports, and digested for general use in the authoritative writings of the venerable sages of the law.

The Roman law, as practised in the times of its liberty, paid also a great regard to custom; but not so much as our law: it only then adopting it when the written law was deficient. Though the reasons alleged in the Digest will fully justify our practice in making it of equal authority with, when it is not contradicted by, the written law. "For since (says Julianus) the written law binds us for no other reason but because it is approved by the judgment of the people, therefore those laws which the people have approved without writing ought also to bind every body. For where is the difference, whether the people declare their assent to a law by suffrage, or by a uniform course of acting accordingly?" Thus did they reason while Rome had some remains of her freedom; but, when the imperial tyranny came to be fully established, the civil laws speak a very different language. *Quod principi placuit legis habet vigorem, cum populus ei et in eum omne suum imperium et potestatem conferat*, says Ulpian. *Imperator solus et conditor et interpres legis existimatur*, says the code. And again, *Sacrilegii instar est rescripto principis obviari*. And indeed it is one of the characteristic marks of British liberty, that the common law depends upon custom; which carries this internal evidence of freedom along with it, that it probably was introduced by the voluntary consent of the people.

II. The second branch of the unwritten laws of England are particular customs, or laws which affect only the inhabitants of particular districts.

These particular customs, or some of them, are without doubt the remains of that multitude of local customs before-mentioned, out of which the common law, as it now stands, was collected at first by king Alfred, and afterwards by king Edgar and Edward the Confessor: each district mutually sacrificing some of its own special usages, in order that the whole kingdom might enjoy the benefit of one uniform and universal system of laws. But, for reasons that have been now long forgotten, particular counties, cities, towns, manors, and lordships, were very early indulged with the privilege of abiding by their own customs, in contradistinction to the rest of the nation at large: which privilege is confirmed to them by several acts of parliament.

Such is the custom of gavelkind in Kent and some other parts of the kingdom (though perhaps it was also general till the Norman conquest); which ordains, among other things, that not the eldest son only of the father shall succeed to his inheritance, but all the sons alike; and that, though the ancestor be attainted and hanged, yet the heir shall succeed to his estate, without any escheat to the lord.—Such is the custom that prevails in divers ancient boroughs, and therefore called borough-english, that the youngest son shall inherit the estate, in preference to all his elder brothers.—Such is the custom in other boroughs, that a widow shall be entitled, for her dower, to all her husband's lands; whereas at the common law she shall be endowed of one-third part only.—Such also are the special and particular customs of manors, of which every one has more or less, and which bind all the copyhold tenants that hold of the said manors.—Such likewise is the custom of holding divers inferior courts, with power of trying causes, in cities and trading towns; the right of holding which, when no royal grant can be shewn, depends entirely upon immemorial and established usage.—Such, lastly, are many particular customs within the city of London, with regard to trade, apprentices, widows, orphans, and a variety of other matters. All these are contrary to the general law of the land, and are good only by special usage; though

the customs of London are also confirmed by act of parliament.

To this head may most properly be referred a particular system of customs used only among one set of the king's subjects, called the custom of merchants, or *lex mercatoria:* which, however different from the general rules of the common law, is yet engrafted into it, and made a part of it; being allowed, for the benefit of trade, to be of the utmost validity in all commercial transactions; for it is a maxim of law, that *cuilibet in sua arte credendum est.*

The rules relating to particular customs regard either the proof of their existence; their legality when proved; or their usual method of allowance. And first we will consider the rules of proof.

As to gavelkind, and borough-english, the law takes particular notice of them; and there is no occasion to prove that such customs actually exist, but only that the lands in question are subject thereto. All other private customs must be particularly pleaded; and as well the existence of such customs must be shewn, as that the thing in dispute is within the custom alleged. The trial in both cases (both to shew the existence of the custom, as "that in the manor of Dale lands shall descend only to the heirs male, and never to the heirs female;" and also to shew "that the lands in question are within that manor)" is by jury of 12 men, and not by the judges; except the same particular custom has been before tried, determined, and recorded, in the same court.

The customs of London differ from all others in point of trial: for if the existence of the custom be brought in question, it shall not be tried by a jury, but by certificate from the lord mayor and aldermen by the mouth of their recorder; unless it be such a custom as the corporation is itself interested in, as a right of taking toll, &c. for then the law permits them not to certify on their own behalf.

When a custom is actually proved to exist, the next inquiry is into the legality of it; for if it is not a good custom, it ought to be no longer used. *Malus usus abolendus est,* is an established maxim of the law. To make a particular custom good, the following are necessary requisites:

1. That it have been used so long, that the memory of man runneth not to the contrary. So that, if any one can shew the beginning of it, it is no good custom. For which reason, no custom can prevail against an express act of parliament; since the statute itself is a proof of a time when such a custom did not exist.

2. It must have been continued. Any interruption would cause a temporary ceasing: the revival gives it a new beginning, which will be within time of memory, and thereupon the custom will be void. But this must be understood with regard to an interruption of the right; for an interruption of the possession only, for 10 or 20 years, will not destroy the custom. As if the inhabitants of a parish have a customary right of watering their cattle at a certain pool, the custom is not destroyed though they do not use it for 10 years; it only becomes more difficult to prove: but if the right be any how discontinued for a day, the custom is quite at an end.

3. It must have been peaceable, and acquiesced in; not subject to contention and dispute. For as customs owe their original to common consent, their being immemorially disputed, either at law or otherwise, is a proof that such consent was wanting.

4. Customs must be reasonable; or rather, taken negatively, they must not be unreasonable. Which is not always, as Sir Edward Coke says, to be understood of every unlearned man's reason; but of artificial and legal reason, warranted by authority of law. Upon which account a custom may be good, though the particular reason of it cannot be assigned; for it sufficeth, if no good legal reason can be assigned against it. Thus a custom in a parish, that no man shall put his beasts into the common till the third of October, would be good; and yet it would be hard to shew the reason why that day in particular is fixed upon, rather than the day before or after. But a custom, that no cattle shall be put in till the lord of the manor has first put in his, is unreasonable, and therefore bad: for peradventure the lord will never put in his, and then the tenants would lose all their profits.

5. Customs ought to be certain. A custom, that lands shall descend to the most worthy of the owner's blood, is void; for how shall this worth be determined? But a custom to descend to the next male of the blood, exclusive of females, is certain, and therefore good. A custom to pay two-pence an acre in lieu of tythes, is good; but to pay sometimes two-pence and sometimes three-pence, as the occupier of the land pleases, is bad for its uncertainty. Yet a custom, to pay a year's improved value for a fine on a copyhold estate, is good; though the value is a thing uncertain: for the value may at any time be ascertained; and the maxims of law is, *Id certum est quod certum reddi potest.*

6. Customs, though established by consent, must be (when established) compulsory: and not left to the option of every man, whether he will use them or no. Therefore a custom, that all the inhabitants shall be rated toward the maintenance of a bridge, will be good: but a custom, that every man is to contribute thereto at his own pleasure, is idle and absurd, and indeed no custom at all.

7. Lastly, customs must be consistent with each other. One custom cannot be set up in opposition to another. For if both are really customs, then both are of equal antiquity, and both established by mutual consent: which to say of contradictory customs, is absurd. Therefore, if one man prescribes that by custom he has a right to have windows looking into another's garden, the other cannot claim a right by custom to stop up or obstruct those windows: for these two contradictory customs cannot both be good, nor both stand together. He ought rather to deny the existence of the former custom.

Next, as to the allowance of special customs. Customs, in derogation of the common law, must be construed strictly. Thus, by the custom of gavelkind, an infant of fifteen years may by one species of conveyance (called a *deed of feoffment*) convey away his lands in fee simple, or for ever. Yet this custom does not empower him to use any other conveyance, or even to lease them for seven years; for the custom must be strictly pursued. And, moreover, all special customs must submit to the king's prerogative. Therefore, if the king purchases lands of the nature of gavelkind, where all the sons inherit equally; yet, upon the king's demise, his eldest son shall succeed to those lands alone. And thus much for the second part of the *leges non scriptæ,* or those particular customs which affect particular persons or districts only.

III. The third branch are those peculiar laws

which by custom are adopted and used only in certain peculiar courts and jurisdictions. And by these are understood the civil and canon laws.

It may seem a little improper, at first view, to rank these laws under the head of *leges non scriptæ*, or unwritten laws, seeing they are set forth by authority in their pandects, their codes, and their institutions; their councils, decrees, and decretals; and enforced by an immense number of expositions, decisions, and treatises of the learned in both branches of the law. But this is done after the example of Sir Matthew Hale, because it is most plain, that it is not on account of their being written laws, that either the canon law, or the civil law, have any obligation within this kingdom: neither do their force and efficacy depend upon their own intrinsic authority; which is the case of our written laws or acts of parliament. They bind not the subjects of England, because their materials were collected from popes or emperors; were digested by Justinian, or declared to be authentic by Gregory. These considerations give them no authority here; for the legislature of England doth not, nor ever did, recognize any foreign power as superior or equal to it in this kingdom; or as having the right to give law to any the meanest of its subjects. But all the strength that either the papal or imperial laws have obtained in this realm (or indeed in any other kingdom in Europe) is only because they have been admitted and received by immemorial usage and custom in some particular cases, and some particular courts; and then they form a branch of the *leges non scriptæ*, or customary law: or else, because they are in some other cases introduced by consent of parliament, and then they owe their validity to the *leges scriptæ*, or statute law. This is expressly declared in those remarkable words of the statute 25 Hen. VIII. c. 21. addressed to the king's royal majesty—"This your grace's realm, recognizing no superior under God but only your grace, hath been and is free from subjection to any man's laws, but only to such as have been devised, made, and ordained within this realm, for the wealth of the same; or to such other as, by sufference of your grace and your progenitors, the people of this your realm have taken at their free liberty, by their own consent, to be used among them; and have bound themselves, by long use and custom, to the observance of the same: not as to the observance of the laws of any foreign prince, potentate, or prelate; but as to the customed and ancient laws of this realm, originally established as laws of the same, by the said sufferance, consents, and custom; and none otherwise."

1. By the civil law, absolutely taken, is generally understood the civil or municipal law of the Roman empire, as comprised in the institutes, the code, and the digest of the emperor Justinian, and the novel constitutions of himself and some of his successors.

The Roman law founded first upon the regal constitutions of their ancient kings, next upon the twelve tables of the decemviri, then upon the laws or statutes enacted by the senate or people, the edicts of the prætor, and the *responsa prudentum*, or opinions of learned lawyers, and lastly upon the imperial decrees or constitutions of successive emperors) had grown to so great a bulk, or, as Livy expresses it, *tam immensus aliarum super alias acervatarum legum cumulus*, that they were computed to be many camels load by an author who preceded Justinian. This was in part remedied by the collections of three private lawyers, Gregorius, Hermogenes, and Papirius; and then by the emperor Theodosius the younger, by whose orders a code was compiled, A. D. 438, being a methodical collection of all the imperial constitutions then in force: which Theodosian code was the only book of civil law received as authentic in the western part of Europe, till many centuries after; and to this it is probable that the Franks and Goths might frequently pay some regard, in framing legal constitutions for their newly erected kingdoms. For Justinian commanded only in the eastern remains of the empire; and it was under his auspices that the present body of civil law was compiled and finished by Tribonian and other lawyers, about the year 533.

This consists of, 1. The institutes; which contain the elements or first principles of the Roman law, in four books. 2. The digests or pandects, in 50 books; containing the opinions and writings of eminent lawyers, digested in a systematical method. 3. A new code, or collection of imperial constitutions; the lapse of a whole century having rendered the former code of Theodosius imperfect. 4. The novels, or new constitutions, posterior in time to the other books, and amounting to a supplement to the code; containing new decrees of successive emperors, as new questions happened to arise. These form the body of Roman law, or *corpus juris civilis*, as published about the time of Justinian: which, however, fell soon into neglect and oblivion, till about the year 1130, when a copy of the digests was found at Amalfi in Italy; which accident, concurring with the policy of the Roman ecclesiastics, suddenly gave new vogue and authority to the civil law, introduced it into several nations, and occasioned that mighty inundation of voluminous comments, with which this system of law, more than any other, is now loaded.

2. The canon law is a body of Roman ecclesiastical law, relative to such matters as that church either has, or pretends to have, the proper jurisdiction over. This is compiled from the opinions of the ancient Latin fathers, the decrees of general councils, the decretal epistles and bulls of the holy sec. All which lay in the same disorder and confusion as the Roman civil law; till, about the year 1151, one Gratian, an Italian monk, animated by the discovery of Justinian's pandects, reduced the ecclesiastical constitutions also into some method, in three books; which he entitled Concordia Discordantium Canonum, but which are generally known by the name of Decretum Gratiani. These reached as low as the time of Pope Alexander III. The subsequent papal decrees, to the pontificate of Gregory IX. were published in much the same method under the auspices of that pope, about the year 1230, in five books, entitled Decretalia Gregorii noni. A sixth book was added by Boniface VIII. about the year 1298, which is called Sextus Decretalium. The Clementine constitutions, or decrees of Clement V. were in like manner authenticated in 1317 by his successor John XXII.; who also published twenty constitutions of his own, called Extravagantes Joannis: all which in some measure answer to the novels of the civil law. To these have been since added some decrees of

later popes, in five books, called Extravagantes Communes. And all these together, Gratian's decree, Gregory's decretals, the sixth decretal, the Clementine constitutions, and the Extravagants of John and his successors, form the *corpus juris canonici*, or body of the Roman canon law.

Besides these pontifical collections, which during the times of popery were received as authentic in this island, as well as in other parts of Christendom, there is also a kind of national canon law, composed of legatine and provincial constitutions, and adapted only to the exigencies of this church and kingdom. The legatine constitutions were ecclesiastical laws, enacted in national synods, held under the cardinals Otho and Othobon, legates from Pope Gregory IX. and Pope Clement IV. in the reign of King Henry III. about the years 1220 and 1268. The provincial constitutions are principally the decrees of provincial synods, held under divers Archbishops of Canterbury, from Stephen Langton, in the reign of Henry III. to Henry Chichele in the reign of Henry V.; and adopted also by the province of York in the reign of Henry VI. At the dawn of the reformation, in the reign of King Henry VIII. it was enacted in parliament, that a review should be had of the canon law; and till such review should be made, all canons, constitutions, ordinances, and synodals provincial, being then already made, and not repugnant to the law of the land or the king's prerogative, should still be used and executed. And, as no such review has yet been perfected, upon this statute now depends the authority of the canon law in England.

As for the canons enacted by the clergy under James I. in the year 1603, and never confirmed in parliament, it has been solemnly adjudged upon the principles of law and the constitution, that where they are not merely declaratory of the ancient canon law, but are introductory of new regulations, they do not bind the laity, whatever regard the clergy may think proper to pay them.

There are four species of courts, in which the civil and canon laws are permitted, under different restrictions, to be used. I. The courts of the archbishops and bishops, and their derivative officers, usually called Courts Christian (*curiæ Christianitatis*), or the Ecclesiastical Courts. 2. The Military Courts. 3. The Courts of Admiralty. 4. The Courts of the two Universities. In all, their reception in general, and the different degrees of that reception, are grounded entirely upon custom; corroborated in the latter instance by act of parliament, ratifying those charters which confirm the customary law of the universities. The more minute consideration of them will fall under their proper articles. It will suffice at present to remark a few particulars relative to them all, which may serve to inculcate more strongly the doctrine laid down concerning them.

1. And first, the courts of common law have the superintendency over these courts; to keep them within their jurisdictions; to determine wherein they exceed them; to restrain and prohibit such excess; and (in case of contumacy) to punish the officer who executes, and, in some cases, the judge who enforces, the sentence so declared to be illegal.

2. The common law has reserved to itself the exposition of all such acts of parliament as concern either the extent of these courts, or the matters depending before them. And, therefore, if these courts either refuse to allow these acts of parliament, or will expound them in any other sense than what the common law puts upon them, the king's courts at Westminster will grant prohibitions to restrain and control them.

3. An appeal lies from all these courts to the king, in the last resort; which proves that the jurisdiction exercised in them is derived from the crown of England, and not from any foreign potentate, or intrinsic authority of their own.—And, from these three strong marks and ensigns of superiority, it appears beyond a doubt, that the civil and canon laws, though admitted in some cases by custom in some courts, are only subordinate and *leges sub graviori lege*; and that thus admitted, restrained, altered, new-modelled, and amended, they are by no means with us a distinct independent species of laws, but are inferior branches of the customary or unwritten laws of England, properly called the King's Ecclesiastical, the King's Military, the King's Maritime, or the King's Academical, Laws.

Let us next proceed to the *leges scriptæ*, the written laws of the kingdom: which are statutes, acts, or edicts, made by the king's majesty, by and with the advice of the lords spiritual and temporal and commons in parliament assembled. The oldest of these now extant, and printed in our statute books, is the famous *magna charta*, as confirmed in parliament 9 Hen. III. though doubtless there were many acts before that time, the records of which are now lost, and the determinations of them perhaps at present currently received for the maxims of the old common law.

The manner of making these statutes being explained under the articles Bill and Parliament, we shall here only take notice of the different kinds of statutes; and of some general rules with regard to their construction.

First, as to their several kinds. Statutes are either general or special, public or private. A general or public act is an universal rule that regards the whole community: and of this the courts of law are bound to take notice judicially and *ex officio*, without the statute being particularly pleaded, or formerly set forth, by the party who claims an advantage under it. Special or private acts are rather exceptions than rules, being those which only operate upon particular persons and private concerns; such as the Romans entitled *senatus decreta*, in contradistinction to the *senatus consulta*, which regarded the whole community; and of these the judges are not bound to take notice, unless they be formally shewn and pleaded. Thus, to shew the distinction, the statute 13 Eliz. c. 10. to prevent spiritual persons from making leases for longer terms than 21 years, or three lives, is a public act; it being a rule prescribed to the whole body of spiritual persons in the nation: but an act to enable the bishop of Chester to make a lease to A. B. for 60 years, is an exception to this rule; it concerns only the parties and the bishop's successors, and is therefore a private act.

Statutes also are either declaratory of the common law, or remedial of some defects therein. Declaratory, where the old custom of the kingdom is almost fallen into disuse, or become disputable; in which case the parliament has thought proper, *in prepetuum rei testimonium*, and for avoiding all doubts and difficulties, to declare what the common law is and ever hath been.

Thus the statute of treasons; 25 Edw. III. cap. 2. doth not make any new species of treasons; but only, for the benefit of the subject, declares and enumerates those several kinds of offence which before were treason at the common law. Remedial statutes are those which are made to supply such defects, and abridge such superfluities, in the common law, as arise either from the general imperfection of all human laws, from change of time and circumstances, from the mistakes and unadvised determinations of unlearned judges, or from any other cause whatsoever. And this being done, either by enlarging the common law where it was too narrow and circumscribed, or by restraining it where it was too lax and luxuriant, hath occasioned another subordinate division of remedial acts of parliament into enlarging and restraining statutes. To instance again in the case of treason. Clipping the current coin of the kingdom was an offence not sufficiently guarded against by the common law: therefore it was thought expedient by statute 5 Eliz. c. 11. to make it high treason, which it was not at the common law; so that this was an enlarging statute. At common law, also, spiritual corporations might lease out their estates for any term of years, till prevented by the statute 13 Eliz. before-mentioned: this was therefore a restraining statute.

Secondly, the rules to be observed with regard to the construction of statutes, are principally these which follow:

1. There are three points to be considered in the construction of all remedial statutes; the old law, the mischief, and the remedy; that is, how the common law stood at the making of the act; what the mischief was, for which the common law did not provide; and what remedy the parliament hath provided to cure this mischief. And it is the business of the judges so to construe the act, as to suppress the mischief and advance the remedy. Let us instance again in the same restraining statute of 13 Eliz. c. 10. By the common law, ecclesiastical corporations might let as long leases as they thought proper: the mischief was, that they let long and unreasonable leases, to the impoverishment of their successors. The remedy applied by the statute was, by making void all leases by ecclesiastical bodies for longer terms than three lives, or 21 years. Now in the construction of this statute it is held, that leases, though for a longer term, if made by a bishop, are not void during the bishop's continuance in his see; or, if made by a dean and chapter, they are not void during the continuance of the dean; for the act was made for the benefit and protection of the successor. The mischief is therefore sufficiently suppressed by vacating them after the determination of the interest of the granters; but the leases, during their continuance, being not within the mischief, are not within the remedy.

2. A statute, which treats of things or persons of an inferior rank, cannot by any general words be extended to those of a superior. So a statute, treating of "deans, prebendaries, parsons, vicars, and others having spiritual promotion," is held not to extend to bishops, though they have spiritual promotion; deans being the highest persons named, and bishops being of a still higher order.

3. Penal statutes must be construed strictly. Thus the statute 1 Edw. VI. c. 12. having enacted that those who are convicted of stealing horses should not have the benefit of clergy, the judges conceived that this did not extend to him who should steal but one horse, and therefore procured a new act for that purpose in the following year. And, to come nearer to our own times, by the statute 14 Geo. II. c. 6. stealing sheep or other cattle was made felony without benefit of clergy. But these general words, "or other cattle," being looked upon as much too loose to create a capital offence, the act was held to extend to nothing but mere sheep. And therefore, in the next sessions, it was found necessary to make another statute, 15 Geo. II. c. 34. extending the former to bulls, cows, oxen, steers, bullocks, heifers, calves, and lambs, by name.

4. Statutes against frauds are to be liberally and beneficially expounded. This may seem a contradiction to the last rule; most statutes against frauds being in their consequences penal. But this difference is here to be taken: where the statute acts upon the offender, and inflicts a penalty, as the pillory, or a fine, it is then to be taken strictly; but when the statute acts upon the offence, by setting aside the fraudulent transaction, here it is to be construed liberally. Upon this footing the statute of 13 Eliz. c. 5. which voids all gifts of goods, &c. made to defraud creditors and others, was held to extend by the general words to a gift made to defraud the queen of a forfeiture.

5. One part of a statute must be so construed by another, that the whole may (if possible) stand: *ut res magis valeat quam pereat*. As if land be vested in the king and his heirs by act of parliament, saving the right of A; and A has at that time a lease of it for three years; here A shall hold it for his term of three years, and afterwards it shall go to the king. For this interpretation furnishes matter for every clause of the statute to work and operate upon. But,

6. A saving totally repugnant to the body of the act is void. If therefore an act of parliament vests land in the king and his heirs, saving the right of all persons whatsoever; or vests the land of A in the king, saving the right of A: in either of these cases the saving is totally repugnant to the body of the statute, and (if good) would render the statute of no effect or operation; and therefore the saving is void, and the land vests absolutely in the king.

7. Where the common law and a statute differ, the common law gives place to the statute; and an old statute gives place to a new one. And this upon the general principle laid down in the last section, that *leges posteriores priores contrarias abrogant*. But this is to be understood only when the latter statute is couched in negative terms, or by its matter necessarily implies a negative. As if a former act says, that a juror upon such a trial shall have twenty pounds a-year, and a new statute comes and says he shall have twenty marks; here the latter statute, though it does not express, yet necessarily implies, a negative, and virtually repeals the former. For if twenty marks be made qualification sufficient, the former statute which requires twenty pounds is at an end. But if both the acts be merely affirmative, and the substance such that both may stand together, here the latter does not repeal the former, but they shall both have a concurrent efficacy. If by a former law an offence be indictable at the quarter sessions, and a later law makes the same offence indictable at the assizes; here the jurisdiction of the sessions is not taken away, but both have a concurrent

jurisdiction, and the offender may be prosecuted at either: unless the new statute subjoins express negative words; as, that the offence shall be indictable at the assizes, and not elsewhere.

8. If a statute, that repeals another, is itself repealed afterwards, the first statute is hereby revived, without any formal words for that purpose. So when the statutes of 26 and 35 Hen. VIII. declaring the king to be the supreme head of the church, were repealed by a statute 1 and 2 Philip and Mary, and this latter statute was afterwards repealed by an act of 1 Eliz. there needed not any express words of revival in queen Elizabeth's statute, but these acts of king Henry were impliedly and virtually revived.

9. Acts of parliament derogatory from the power of subsequent parliaments bind not. So the statute 11 Hen. VII. c. 1. which directs, that no person for assisting a king *de facto* shall be attainted of treason by act of parliament or otherwise, is held to be good only as to common prosecutions for high treason; but will not restrain or clog any parliamentary attainder. Because the legislature, being in truth the sovereign power, is always of equal, always of absolute authority: it acknowledges no superior upon earth, which the prior legislature must have been if its ordinances could bind the present parliament. And upon the same principle, Cicero, in his letters to Atticus, treats with a proper contempt these restraining clauses, which endeavour to tie up the hands of succeeding legislatures. "When you repeal the law itself (says he) you at the same time repeal the prohibitory clause which guards against such repeal."

10. Lastly, acts of parliament that are impossible to be performed are of no validity; and if there arise out of them collaterally any absurd consequences, manifestly contradictory to common reason, they are with regard to those collateral consequences void. We lay down the rule with these restrictions; though we know it is generally laid down more largely, that acts of parliament contrary to reason are void. But if the parliament will positively enact a thing to be done which is unreasonable, we know of no power that can control it: and the examples usually alleged in support of this sense of the rule do none of them prove, that where the main object of a statute is unreasonable, the judges are at liberty to reject it; for that were to set the judicial power above that of the legislature, which would be subversive of all government. But where some collateral matter arises out of the general words, and happens to be unreasonable; there the judges are in decency to conclude that this consequence was not foreseen by the parliament, and therefore they are at liberty to expound the statute by equity, and only *quoad hoc* disregard it. Thus if an act of parliament gives a man power to try all causes that arise within his manor of Dale; yet, if a cause should arise in which he himself is party, the act is construed not to extend to that, because it is unreasonable that any man should determine his own quarrel. But, if we could conceive it possible for the parliament to enact, that he should try as well his own causes as those of other persons, there is no court that has power to defeat the intent of the legislature, when couched in such evident and express words as leave no doubt whether it was the intent of the legislature or not.

These are the several grounds of the laws of England: over and above which, equity is also frequently called in to assist, to moderate, and to explain them. What equity is, and how impossible in its very essence to be reduced to stated rules, hath been shewn above. It may be sufficient, therefore, to add in this place, that, besides the liberality of sentiment with which our common-law judges interpret acts of parliament, and such rules of the unwritten law as are not of a positive kind, there are also courts of equity established for the benefit of the subject, to detect latent frauds and concealments which the process of the courts of law is not adapted to reach; to enforce the execution of such matters of trust and confidence, as are binding in conscience, though not cognizable in a court of law; to deliver from such dangers as are owing to misfortune or oversight; and to give a more specific relief, and more adapted to the circumstances of the case, than can always be obtained by the generality of the rules of the positive or common law. This is the business of the courts of equity, which however are only conversant in matters of property. For the freedom of our constitution will not permit, that in criminal cases a power should be lodged in any judge to construe the law otherwise than according to the letter. This caution, while it admirably protects the public liberty, can never bear hard upon individuals. A man cannot suffer more punishment than the law assigns, but he may suffer less. The laws cannot be strained by partiality to inflict a penalty beyond what the letter will warrant; but, in cases where the letter induces any apparent hardship, the crown has the power to pardon.

The objects of the laws of England are, 1. The rights of persons. 2. The rights of things. 3. Private wrongs. 4. Public wrongs. See the words PERSONS, RIGHTS, WRONGS, PROPERTY, CRIMES, PUNISHMENTS, JURY, PLEADINGS, &c.

LAW-*Language*. In England, all law proceedings were formerly written, as indeed all public proceedings were, in Norman or law French, and even the arguments of the counsel and decisions of the court were in the same barbarous dialect. An evident and shameful badge, it must be owned, of tyranny and foreign servitude; being introduced under the auspices of William the Norman and his sons: whereby the observation of the Roman satirist was once more verified, that *Gallia causidicos docuit facunda Britannos*. This continued till the reign of Edward III. who, having employed his arms successfully in subduing the crown of France, thought it unbeseeming the dignity of the victors to use any longer the language of a vanquished country. By a statute, therefore, passed in the 36th year of his reign, it was enacted, that for the future all pleas should be pleaded, shown, defended, answered, debated, and judged, in the English tongue, but be entered and enrolled in Latin: in like manner as Don Alonso X. king of Castile (the great-grandfather of our Edward III.) obliged his subjects to use the Castilian tongue in all legal proceedings; and as, in 1286, the German language was established in the courts of the empire. And perhaps, if our legislature had then directed that the writs themselves, which are mandates from the king to his subjects to perform certain acts or to appear at certain places, should have been framed in the English language, according to the rule of our ancient law, it had not been very improper. But the record or enrolment of those writs and the proceedings thereon, which was calculated for the benefit of pos-

terity, was more serviceable (because more durable) in a dead and immutable language than in any flux or living one. The practisers, however, being used to the Norman language, and therefore imagining they could express their thoughts more aptly and more concisely in that than in any other, still continued to take their notes in law French; and of course, when those notes came to be published, under the denomination of reports, they were printed in that barbarous dialect; which, joined to the additional terrors of a Gothic black letter, has occasioned many a student to throw away his Plowden and Littleton, without venturing to attack a page of them. And yet, in reality, upon a nearer acquaintance, they, would have found nothing very formidable in the language; which differs in its grammar and orthography as much from the modern French, as the diction of Chaucer and Gower does from that of Addison and Pope. Besides, as the English and Norman languages were concurrently used by our ancestors for several centuries together, the two idioms have naturally assimilated, and mutually borrowed from each other: for which reason the grammatical construction of each is so very much the same, that we apprehend an Englishman (with a week's preparation) would understand the laws of Normandy, collected in their grand costumier, as well, if not better, than a Frenchman bred within the walls of Paris.

The Latin which succeeded the French for the entry and enrolment of pleas, and which continued in use for four centuries, answers so nearly to the English (oftentimes word for word) that it is not at all surprising it should generally be imagined to be totally fabricated at home, with little more art or trouble than by adding Roman terminations to English words. Whereas in reality it is a very universal dialect, spread throughout all Europe at the irruption of the northern nations; and particularly accommodated and moulded to answer all the purposes of the lawyers with a peculiar exactness and precision. This is principally owing to the simplicity, or (if the reader pleases) the poverty and baldness of its texture, calculated to express the ideas of mankind just as they arise in the human mind, without any rhetorical flourishes, or perplexed ornaments of style: for it may be observed, that those laws and ordinances, of public as well as private communities, are generally the most easily understood, where strength and perspicuity, not harmony or elegance of expression, have been principally consulted in compiling them. These northern nations, or rather their legislators, though they resolved to make use of the Latin tongue in promulging their laws, as being more durable and more generally known to their conquered subjects than their own Teutonic dialects, yet (either through choice or necessity) have frequently intermixed therein some words of a Gothic original; which is, more or less, the case in every country of Europe, and therefore not to be imputed as any peculiar blemish in our English legal latinity. The truth is, what is generally denominated law-Latin is in reality a mere technical language, calculated for eternal duration, and easy to be apprehended both in present and future times; and on those accounts best suited to preserve those memorials which are intended for perpetual rules of action. The rude pyramids of Egypt have endured from the earliest ages, while the more modern and more elegant structures of Attica, Rome, and Palmyra, have sunk beneath the stroke of time.

As to the objection of locking up the law in a strange and unknown tongue, this is of little weight with regard to records; which few have occasion to read, but such as do, or ought to, understand the rudiments of Latin. And besides, it may be observed of the law-Latin, as the very ingenious Sir John Davis observes of the law-French, "that it is so very easy to be learned, that the meanest wit that ever came to the study of the law doth come to understand it almost perfectly in ten days without a reader."

It is true, indeed, that the many terms of art with which the law abounds are sufficiently harsh when latinized (yet not more so than those of other sciences), and may, as Mr. Selden observes, give offence "to some grammarians of squeamish stomachs, who would rather choose to live in ignorance of things the most useful and important, than to have their delicate ears wounded by the use of a word unknown to Cicero, Sallust, or the other writers of the Augustan age." Yet this is no more than must unavoidably happen when things of modern use, of which the Romans had no idea, and consequently no phrases to express them, come to be delivered in the Latin tongue. It would puzzle the most classical scholar to find an appellation, in his pure latinity, for a constable, a record, or a deed of feoffment: it is therefore to be imputed as much to necessity as ignorance, that they were styled in our forensic dialect, *constabularius, recordum,* and *feoffamentum.*

Law *of marque*, a law by which those who are driven to make use of it, take the goods, or shipping, of the party that has done them wrong, and of whom they cannot get ordinary justice, whenever they can take him within their own bounds or precincts. 27 Ed. III. cap 17.

Law *of the staple*, the same with Law merchant.

Law, *merchant*, a summary sort of law, originally differing from the common law, though now adopted, and become a part of the laws of the kingdom. One point of it consists in this, that if there be two joint merchants of wares, and one of them dies, his executor shall have the moiety; which is not allowed in the case of others, not merchants. See Custom.

Law, *spiritual*, is the ecclesiastical or canon law, allowed and authorized in this realm, so far as it is not against the common law, nor against the statutes and customs of the kingdom. And according to such ecclesiastical laws, the ordinary and other ecclesiastical judges proceed in cases within their cognizance.

Law, in *Scripture History*, one of the three divisions of the Old Testament, comprehending Genesis, Exodus, Leviticus, Numbers, Deuteronomy. See Canon.

Laws, *Game*. See Game *Laws*.

Laws *of Motion*. See Axioms.

Law (John), a famous projector, born at Edinburgh. He went to Paris, where he raised himself to affluence, and obtained several great places by the famous scheme of a national bank, and the Mississippi company, which he pretended was to pay off the debt of the nation and enrich individuals; but the whole fabric fell to the ground and ruined thousands of families. Law escaped popular vengeance, and got to Venice where he died in poverty in 1729. He is the au-

thor of a small volume on money and paper credit.

LAW (Edmund), D. D. bishop of Carlisle, was born in the parish of Cartmel in Lancashire, in the year 1703. His father, who was a clergyman, held a small chapel in that neighbourhood; but the family had been situated at Askham, in the county of Westmoreland. He was educated for some time at Cartmel school, afterwards at the free grammar-school at Kendal; from which he went, very well instructed in the learning of grammar schools, to St. John's College in Cambridge.

Soon after taking his first degree, he was elected fellow of Christ-college, and during his residence there, he became known to the public by a translation of Archbishop King's Essay upon the Origin of Evil, with copious notes; in which many metaphysical subjects, curious and interesting in their own nature, are treated of with great ingenuity, learning, and novelty. To this work was prefixed, under the name of a Preliminary Dissertation, a very valuable piece, written by the reverend Mr. Gay of Sidney college. Whilst at Christ-college, he also undertook and went through a very laborious part in preparing for the press an edition of Stephens's Thesaurus.

Dr. Law held the see of Carlisle almost 19 years; during which time he twice only omitted spending the summer months in his diocese. In the year 1787 he paid this visit in a state of great weakness and exhaustion; and died at Rose about a month after his arrival there, on the 14th day of August, and in the 84th year of his age.

The life of this prelate was spent in incessant reading and thought, almost entirely directed to metaphysical and religious inquiries. Besides the works already mentioned, he published, in 1734 or 1735, a very ingenious inquiry into the Ideas of Space, Time, &c. in which he combats the opinions of Dr. Clarke and his adherents on these subjects.

The bishop was interred with due solemnity in his cathedral church, in which a handsome monument is erected to his memory.

LAW (Rev. William) a religious writer of considerable eminence, was born at King's Cliffe, Northamptonshire, in 1686. Of his education very little is known: he took the degrees of A. B. and A. M. at Oxford, and left that university about the year 1712. Mr. Law was a bachelor all his life-time. Such was his love of privacy and a state of reflection, that it was very seldom indeed that he passed more than two hours in the company of any person. With a very small patrimony he was remarkably charitable, particularly to his poor neighbours, the manufacturers of wooden-ware, in and about King's Cliffe: in this benevolent disposition he was joined by the two Miss Gibbons, with whom he resided; their object being not to encourage the idle and dissolute, but to promote and facilitate the good intentions of the industrious. Such was the little value this extraordinary man set on money, that he gave the copies of all his works intended for publication to his bookseller; but for one of them Messrs. Richardson and Urquart, insisted upon his acceptance of one hundred guineas. He died April 9th, 1761, aged 75.

Gibbon, the celebrated historian, with whose aunts our divine lived, gives the following character of Mr. Law and his writings:—"Mr. Law died at an advanced age of a suppression of urine, in 1761, at the house of Mrs. Hesther Gibbon, known by the name of the Cliffe, in Northamptonshire, where she still resides. In that family he has left the reputation of a worthy and eminently pious man, who believed all that he professed, and practised all that he enjoined. The character of a non-juror, which he held to the last, is a sufficient evidence of the tenaciousness of his principles in church and state; and the sacrifice of his interest to his conscience will be always respectable.

"His theological writings, which our domestic concerns induced me to read, preserve an amiable, though imperfect sort of life, in my opinion; but here, perhaps, I pronounce with more confidence than knowledge. His last compositions seemed tinctured too much with the mystic enthusiasm of Jacob Behmen; and his discourse on the absolute unlawfulness of the stage, may be called a ridiculous intemperance of sentiment and language.

"But these sallies of phrenzy must not extinguish the praise that is due to Mr. Law, as a wit and a scholar. His arguments on topics of less absurdity, (our readers will recollect that Mr. Gibbon thought all religion absurd) is specious and acute; his manner is lively, his style forcible and clear; and, had not the vigour of his mind been clouded by enthusiasm, he might be ranked with the most agreeable and ingenious writers of the times.

"While the Bangorian controversy was a fashionable theme, he entered the lists. He resumed the contest again with Bishop Hoadly, in which his non-juring principles appear; though he approves himself equal to both prelates.

"On the appearance of the "Fable of the Bees," he drew his pen against the licentiousness of the doctrine of that writer; and morality and religion must rejoice in his applause and victory.

"Mr. Law's master-piece, the "Serious Call," is still read as a popular and powerful book of devotion. His precepts are rigid, but they are formed and derived from the Gospel; his satire is sharp, but his wisdom is from the knowledge of human life; and many of his portraits are not unworthy the pen of La Bruyere. If there yet exists a spark of piety in his reader's mind, he will soon kindle it to a flame; and a philosopher must allow that he is more consistent in his principles than any of the tribe of mystic writers. He handles with equal severity and truth the strange contradiction between faith and practice in the christian world. Under the names of Flavia and Miranda, he has admirably described Mr. Gibbon's two aunts, the worldly and the pious sisters."

We had intended to transcribe the opinions of Dr. Johnson and Mrs. Hannah More, as to the character and talents of Mr. Law: but such a sketch as the above from the hand of such a man as Mr. Gibbon, will supersede the necessity of making any other quotation. Mr. Law's works were, 1. A Serious Call to a Devout and Holy Life, adapted to the state and condition of all orders of christians. 2. A Practical Treatise upon Christian Perfection. 3. Three Letters to the Bishop of Bangor. 4. Remarks upon a late book, entitled; "The Fable of the Bees; or Private Vices, Public Benefits." 5. The abso-

Inte unlawfulness of Stage Entertainments fully demonstrated. 6. The Case of Reason, or Natural Religion, fairly and fully stated. 7. An earnest and serious Answer to Dr. Trapp's Discourse of the Folly, Sin, and Danger, of being righteous over much. 8. The Grounds and Reasons of Christian Regeneration. 9. A Demonstration of the gross and fundamental errors of a late book, called "A plain Account of the Nature and end of the Sacrament of the Lord's Supper," affectionately addressed to all orders of men, and more especially to all the younger clergy. 10. An Appeal to all that doubt or disbelieve the Truths of the Gospel. 11. The Spirit of Prayer; or the soul rising out of the vanity of Time into the Riches of Eternity. 12. The Spirit of Love. 13. The Way to Divine Knowledge. 14. A short but sufficient confutation of the Rev. Dr. Warburton's projected Defence (as he calls it) of Christianity, in his Divine Legation of Moses. 15. A Collection of Letters on the most interesting and important subjects on several occasions. 16. Of Justification by Faith and Works; a Dialogue between a Methodist and a Churchman. 17. An humble, earnest, and affectionate Address to the Clergy.

LA'WFUL. *a.* (*law* and *full.*) Agreeable to law; allowed by law (*Shakspeare*).

LA'WFULLY. *ad.* (from *lawful.*) Legally; agreeably to law (*South*).

LA'WFULNESS. *s.* (from *lawful.*) Legality; allowance of law (*Bacon*).

LA'WGIVER. *s.* (*law* and *giver.*) Legislator; one that makes laws (*Bacon*).

LA'WGIVING. *a.* (*law* and *giving.*) Legislative (*Waller*).

LAWES (Henry), a celebrated musician, and the Purcell of his time. He was a servant to Charles I. in his public and private music, and set some of the works of almost every poet of eminence in that reign. The Comus of Milton, and several of the lyrics of Waller, were set by him; and both these poets have done him honour in their verses. He composed a considerable number of psalm-tunes in the *Cantica Sacra*, for three voices and an organ; and many more of his compositions are to be seen in a work called Select Airs and Dialogues; also in the Treasury of Music, and the Musical Companion. He died in 1662.

LAWES (William), was brother to the former, and a most capital musician. He made above 30 several sorts of music for voices and instruments; nor was there any instrument then in use, but he composed to it as aptly as if he had studied that alone. In the music school at Oxford are two large manuscript volumes of his works in score for various instruments. He was a commissary under general Gerard in the civil war, and, to the great regret of the king, was killed at the siege of Chester in 1645.

LAWING OF DOGS, called also expediating, a cruel and unjustifiable way of limiting their activity, and partially disabling them from following the dictates of their nature, by cutting out the ball or the three claws of the fore feet. It is done to prevent dogs, in the neighbourhood of the royal forests, from chacing the game.

LAWINGEN, a town in Germany, in the circle of Suabia; formerly imperial, but now subject to the duke of Neuburg. Here the duke of Bavaria, in 1704, fortified his camp to defend his country against the British forces and their allies commanded by the duke of Marlborough, who forced their intrenchments. It is seated on the Danube, in Long. 10. 29. E. Lat. 38. 32. N.

LA'WLESS, *a.* (from *law.*) 1. Unrestrained by any law; not subject to law (*Raleigh. Roscommon*). 2. Contrary to law; illegal (*Dryden*).

LA'WLESSLY. *ad.* (from *lawlessly.*) In a manner contrary to law (*Shakspeare*).

LA'WMAKER. *s.* (*law* and *maker.*) Legislator; one who makes laws; a lawgiver (*Hook*).

LAWN. *s.* (*land*, Danish; *lawn*, Welsh). 1. An open space between woods (*Pope*). 2. (*linon*, French.) Fine linen, remarkable for being used in the sleeves of bishops (*Prior*).

LAWRENCE, St. the largest river of N. America, proceeding from Lake Ontario, from which it runs 700 miles to the Atlantic. It is navigable for large ships of war, as far as Quebec, which is above 400 miles; but beyond Montreal, it is so full of shoals and rocks, that it will not admit large vessels without danger. It is here called the Iroquois.

LAWS'ONIA. Egyptian Privet. In botany a genus of the class octandria, order monogynia. Calyx four-cleft; petal four; stamens four pair; capsule four-celled, many seeded. Five species, natives of Asia, mostly of the East Indies. From one or two of these species, L. inermis, or L. spinosa, and perhaps from both the nations, obtain the powder which they term henna or alhenna, and which is used for the purpose of dyeing their nails of a fine golden colour. Their powder is obtained by trituration of the leaves of the plants.

LA'WSUIT. *s.* (*law* and *suit.*) A process in law; a litigation (*Swift*).

LA'WYER. *s.* (from *laws.*) Professor of law; advocate; pleader (*Whitgift*).

LAX. *a.* (*laxus*, Latin.) 1. Loose; not confined (*Milton*). 2. Disunited; not strongly combined (*Wood*). 3. Vague; not rigidly exact (*Baker*). 4. Loose in body, so as to go frequently to stool (*Quincy*). 5. Slack; not tense (*Holder*).

LAX. *s.* A looseness; a diarrhœa.

LAX. In botany, synonimus with flaccidus, and opposed to strictus.—Libere in arcum flexibilis. Delin. Pl.—A lax, loose, flaccid, or flexible stem. Easily bent, in opposition to stiff.—It is applied also to the glume.

LAXATION. *s.* (*laxatio*, Latin.) 1. The act of loosening or slackening. 2. The state of being loosened or slackened.

LA'XATIVE. *a.* (*laxatif*, French.) Having the power to ease costiveness (*Arbuth.*)

LA'XATIVE. *s.* A medicine slightly purgative; a medicine that relaxes the bowels without stimulation (*Dryden*).

LA'XATIVENESS. *s.* (from *laxative.*) Power of easing costiveness.

LAXATOR TYMPANI, In myology. (*Laxator, oris*, m. from *laxo*, to loosen; so called from its office to relax the drum of the ear.) *Externus mallei* of Albinus. *Anterior mallei* of Winslow. *Obliquus auris* of Douglas. A muscle of the internal ear, that draws the malleus obliquely forwards towards its origin; consequently, the membrana tympani is made less concave or is relaxed.

LAXENBURG, a town of Austria, with a palace, where the princes of the house of Austria go for pleasure. It is seated on a small river, 10 miles S. of Vienna. Long. 16. 28. E. Lat. 48. 5. N.

LAXMA'NNIA. In botany a genus of the class syngenesia, order polygamia segregata. Calyx many leaved, the outer leaves spreading. Calycle one-leafed, one flowered, two-awned; florets tubular all hermaphrodite; receptacle chaffy; downless. One species; a native of New South Wales.

LA'XITY. *s.* (*laxitas*, Latin.) 1. Not compression; not close cohesion; slackness of contexture (*Bentley*). 2. Contrariety to rigorous precision: as, laxity of expression. 3. Looseness; not costiveness (*Brown*). 4. Slackness; contrariety to tension (*Quincy*). 5. Openness; not closeness (*Digby*).

LA'XNESS. *s.* Laxity; not tension; not precision; not costiveness (*Holder*).

LAY. Preterit of *lie.*

To LAY. *v. a.* (leᵹan, Saxon.) 1. To place; to put; to reposite (*Milton*). 2. To place along (*Ecclus*). 3. To beat down corn or grass (*Bacon*). 4. To keep from rising; to settle; to still (*Ray*). 5. To fix deep; to lay foundations (*Bacon*). 6. To put; to place (*Shakspeare*). 7. To bury, to inter (*Acts.*) 8. To station or place privily (*Proverbs*). 9. To spread on a surface (*Watts*). 10. To paint; to enamel (*Locke*). 11. To put into any state of quiet (*Bacon*). 12. To calm; to still; to allay (*B. Jonson*). 13. To prohibit a spirit to walk (*L'Estrange*). 14. To set on the table (*Hosea*). 15. To propagate plants by fixing their twigs in the ground (*Mort.*) 16. To wager; to stake (*Dryden*). 17. To reposite any thing (*Psalms*). 18. To exclude eggs (*Bacon*). 19. To apply with violence (*Ezekiel*). 20. To apply nearly (*L'Estrange*). 21. To add; to conjoin (*Isaiah*). 22. To put in a state (*Donne*). 23. To scheme; to contrive (*Chapman*). 24. To charge as a payment (*Locke*). 25. To impute, to charge (*Temple*). 26. To impose, as evil or punishment (*Shak.*) 27. To enjoin as a duty, or a rule of action (*Wycherly*). 28. To exhibit; to offer (*Atter.*) 29. To throw by violence (*Dryden*). 30. To place in comparison (*Raleigh*). 31. To lay apart; to reject; to put away (*James*). 32. To lay aside; to put away; not to retain (*Heb. Granville*). 33. To lay away; to put from one; not to keep (*Esther*). 34. To lay before; to expose to view; to show; to display (*Wake.*) 35. To lay by; to reserve for some future time (*Corinthians*). 36. To lay by; to put from one; to dismiss (*Bacon*). 37. To lay down; to deposit as a pledge, equivalent, or satisfaction (*John*). 38. To lay down; to quit; to resign (*Dryden*). 39. To lay down; to commit to repose (*Dryd.*) 40. To lay down; to advance as a proposition (*Stillingfleet*). 41. To lay for; to attempt by ambush, or insidious practices (*Knolles*). 42. To lay forth; to diffuse; to expatiate (*L'Estrange*). 43. To lay forth; to place when dead in a decent posture (*Shakspeare*). 44. To lay hold of; to seize; to catch (*Locke*). 45. To lay in; to store; to treasure (*Add.*) 46. To lay on; To apply with violence (*Locke*). 47. To lay open; to show; to expose (*Shak.*) 48. To lay over; to incrust; to cover; to decorate superficially (*Habb*). 49. To lay out; to expend (*Boyle*). 50. To lay out; to display; to discover (*Atterbury*). 51. To lay out; to dispose; to plan. 52. To lay out; with the reciprocal pronoun, to exert; to put forth (*Smalridge*). 53. To lay to, to charge upon (*Sidney*). 54. To lay to; to apply with vigour (*Tuls.*) 55. To lay to; to harass; to attack (*Dan.*) 56. To lay together; to collect; to bring into one view (*Addison*). 57. To lay under; to subject to (*Addison*). 58. To lay up; to confine to the bed or chamber (*Temple*). 59. To lay up; to store; to treasure; to reposite for future use (*Hooker*).

To LAY. *v. n.* 1. To bring eggs (*Mort.*) 2. To contrive; to form a scheme (*Daniel*). 3. To lay about; to strike on all sides; to act with great diligence and vigour (*South*). 4. To lay at; to strike; to endeavour to strike (*Job*). 5. To lay in for; To make overtures of oblique invitation (*Dryden*). 6. To lay on; to strike; to beat without intermission (*Dryden*). 7. To lay on; To act with vehemence: used of expences (*Shakspeare*). 8. To lay out; To take measures (*Woodw.*) 9. *To* lay upon; to importune (*Knolles*).

LAY. *s.* (from the verb.) 1. A row; a stratum; a layer (*Bacon*). 2. A wager (*Graunt*).

LAY, a kind of ancient poem among the French, consisting of very short verses. There were two sorts of lays; the great and the little. The first was a poem consisting of twelve couplets of verses, of different measures. The other was a poem consisting of sixteen or twenty verses, divided into four couplets.

These lays were the lyric poetry of the old French poets, who were imitated by some among the English. They were principally used on melancholy subjects, and are said to have been formed on the model of the trochaic verses of the Greek and Latin tragedies. Father Mourgues gives us an extraordinary instance of one of these

ancient lays, in his Treatise of French Poetry:

Sur l' appuis du monde
Que faut-il qu'on fonde
D'espoir?
Cette mer profonde,
En debris feconde,
Fait voir
Calme au matin, l' onde
Et l' orage y gronde
Le soir.

Lay-brothers, among the Romanists, those pious but illiterate persons, who devote themselves in some convent to the service of the religious.

Lay-clerk. A vocal officiate in a cathedral, who takes a part in the services and anthems, but is not of the priesthood.

LAY. *s.* (ley, leaz, Saxon.) Grassy ground; meadow; ground unploughed; lea (*Dryden*).

Lay. *a.* (*lacius* Latin; λαὸς.) Not clerical; regarding or belonging to the people as distinct from the clergy (*Dryden*).

LA'YER. *s.* (from *lay.*) 1. A stratum, or row; a bed; one body spread over another (*Evelyn*). 2. A sprig of a plant (*Miller*). 3. A hen that lays eggs (*Mortimer*).

LA'YMAN. *s.* (*lay* and *man.*) 1. One of the people distinct from the clergy (*Gov. of the Tongue*). 2. An image used by painters in contriving attitudes (*Dryden*).

LA'YSTALL. *s.* A heap of dung (*Spenser*).

LA'ZAR *s.* (from *Lazarus* in the gospel.) One deformed and nauseous with filthy and pestilential diseases (*Dryden*).

LA'ZAR-HOUSE. } *s.* (*lazaret*, French;
LAZARE'TTO. } *lazzaretto*, Italian; from *lazar.*) A house for the reception of the diseased; a hospital (*Milton*).

LAZULITE. In mineralogy. See **Lazulus.**

LAZ'ULUS. Lazulite. Lapis Lazuli. Lazulith. Werner. In mineralogy a genus of the class earths, order siliceous. Consisting of silex with a less proportion of alumine and carbonat of lime, and a small quantity of sulphat of lime and oxyd of iron; opake, hardish, blue, dense, without internal lustre, breaking into into indeterminate fragments, producing a white powder when pounded; neither losing its colour, nor effervescing from acids sprinkled on it, melting easily in the fire into a frothy slag. One species only, found in the confines of Siberia, Tartary and China, in America, and various parts of Europe, generally in solid masses, and usually full of veins of quartz, limestone, and pyrites; colour sky-blue, often with white or yellow spots or veins: if calcined it effervesces a little with acids, and forms with them a gelatinous mass; it retains its colour a long time in the fire, but at last becomes brown: when boiled in concentrated vitriolic acid it dissolves slowly and loses its tinge. It is used for extracting that fine colour called *ultramarine*, and is manufactured into various vessels, and used in Mosaic work. Specific gravity from 2,760. to 2,945: contains silex 46,0. Alumine 14,5; carbonat of lime 6,5; oxyd of iron 3,0; water 2,0; according to Margraff's analysis.

LAZZARONI, a peculiar description of the lowest class of people, that have, for a number of years, constituted a very singular, as well as a very considerable, part of the poor of Naples.

LA'ZILY. *ad.* (from *lazy.*) Idly; sluggishly; heavily (*Locke*).

LA'ZINESS. *s.* (from *lazy.*) Idleness; sluggishness; listlessness; tardiness (*Dryd.*)

LA'ZING. *a.* (from *lazy.*) Sluggish; idle (*South*).

LA'ZY. *a.* (*lijser*, Danish.) 1. Idle; sluggish; unwilling to work (*Pope*). 2. Slow; tedious (*Clarendon*).

LD. is a contraction of lord.

LEA. *s.* (ley, a fallow; leaz, a pasture, Sax.) Ground enclosed; not open (*Milton*).

Lea, a river, which rises near Luton, in Bedfordshire, flows to Hertford and Ware, and dividing Essex from Hertfordshire and Middlesex, falls into the Thames below Blackwall. By this river large quantities of corn and malt are brought out of Hertfordshire to London.

LEACHDALE. See **Leechdale.**

LEAD. (*Plumbum.* Lat. *Bley.* Germ.) A metal of a blueish-white colour, almost silver-white when recently melted, but which very soon tarnishes. It gives a peculiar smell when rubbed or heated. Its specific gravity, according to Brisson, is 11,352. It is very malleable, readily extending under the hammer into very thin leaves, but its tenacity is less than that of any other metal, for a wire one-tenth of an inch in diameter, will break with a weight of 3lbs.

For the systematic character and different species and varieties of this metal, see the article *Plumbum.* Under the present head we shall 1. Explain the mode of smelting and reducing its ores: 2. Their assay and analysis; and 3. The Oxyds of the metal and their various applications to the purposes of arts, manufactures and commerce.

1. *Smelting and Reduction of Lead Ore.*—The only ore of lead purchased in the large way is galena, and the method of treating this is very simple, partly on account of the richness of the ore, and partly on account of the low price of the metal itself, which therefore will not admit of any but the most summary methods of bringing it into a marketable state.

When first brought up from the mine, this ore is dressed by women and boys, who with a hand hammer separate the greater part of the adhering impurities, consisting of blende, iron, pyrites, quartz, calcareous spar, &c. The residue being broken into pieces of about the size of a hazel nut, is washed from all the adhering clay and dirt, and is then ready to be smelted. The furnace used for this purpose is the common reverbaratory with a low arch. A ton or more of the ore is spread on the floor of the furnace, and by means of a pit-coal flame it is soon brought to a red heat. In this state it is occasionally stirred with iron rakes to expose fresh surfaces to the action of the flame, and facilitate the separation

of the sulphur. In a short time the mass begins to acquire a pasty consistence; upon which the heat is lowered, and the ore is kept at a dull red till the sulphur is nearly all got rid of: the fire being then increased, the ore is brought to a state of perfect fusion, and visibly consists of two fluids; the lower is the metallic lead; the upper is a vitreous slag still holding a considerable portion of lead, but mixed with various impurities. In this state of the process the fire is damped; and a few spadefuls of quick-lime are thrown into the fluid mass: by this the scoriæ are suddenly solidified, and are raked to the side of the furnace. The tap-hole is then opened, and the lead runs into moulds placed to receive it, when it congeals into oblong masses called pigs, weighing about 60lbs. each.

As soon as the lead has run out of the furnace, the tap-hole is closed, the scoriæ are replaced in the bed, and being quickly raised to a glowing red heat, are soon melted. The greatest part of the lead that they contained by this means collects into a mass at the bottom: a little lime is thrown in as before, the scoriæ thus rendered solid are raked aside, and the lead which they covered is let off into a mould This second scoriæ, though still holding from five to eight per cent. of lead is now removed from the furnace and applied to no purpose but that of mending roads; the expence of separating the last portions of metal, being more than the value of the produce. The lead of the first running in the best: that procured from the scoriæ being sensibly harder and less malleable on account of the iron that it contains. (For more on this subject see Mr. Sadler's Essay, in Nicholson's Journal, No. 60, N. S.)

2. *Assay and Analysis of the Ores.*—The analysis, as well as the reduction of the ores of lead, is very simple. In general the moist way is the most accurate.

Lead is readily separated from silver, by making a solution of both in nitric acid and adding muriatic acid as long as any precipitate appears. The silver falls down in the form of luna cornea, and with it a quantity of muriat of lead; and if the mixture stand some hours undisturbed, this latter salt also forms needles of crystals on the surface of the luna cornea. All the silver falls down in this manner, but part only of the lead, and the muriat of lead is separated from the luna cornea by boiling water, 22 pints of which will dissolve 1 of muriat of lead, but not a particle of the muriat of silver. The solution of muriat of lead is still more easily affected by digesting in dilute nitric acid, which dissolves it readily, but not the luna cornea.

Lead is separated from bismuth by dissolving both to saturation in nitric acid, either concentrated, or diluted with no more than a fourth of water, and then pouring the concentrated solution into a large quantity of water. The oxyd of bismuth then separates as a heavy white powder, and the lead remains dissolved. Some bismuth however remains, but to the solution may then be added a saturated solution of sulphur of soda, which will precipitate the lead only in the form of a white pulverulent sulphat of lead. But when all the bismuth is to be obtained for the purpose of analysis, and not merely to be separated from the lead, it is better after the bismuth has first precipitated, to add muriatic acid to the clear solution, which will throw down the silver if there be any, and also some muriat of lead mixed with some of the bismuth that remains in the solution, and which last, if redissolved in nitric acid, will again be decomposed by water as before. The whole muriat of lead may then be dissolved in water and nitric acid, and coverted into a sulphat by means of sulphat of soda as before.

Lead is separated also from iron and copper by dissolving both in nitric or muriatic acid, and adding sulphat of soda to precipitate the lead. If the nitric acid be used, some of the oxyd of iron will first precipitate as a brown red ochre, which should be removed.

The same method will separate lead from tin, cobalt and zinc.

The composition of the sulphat of lead artificially formed in these processes has been given with some small variation by different chemists. Klaproth estimates it as follows: 100 parts sulphat of lead dried at a low red heat, are composed of 73,96 of oxyd of lead, and 26,04 of sulphuric acid; and the above oxyd of lead is composed of 69,44 of metallic lead and 4,52 of oxygen. This is not the only state of oxygenation of which lead is capable, but it is that in which, according to Klaproth, it is inferred to exist in all the native salts and oxyds of this metal hitherto analysed.

But where the muriat of lead is free from other admixture, the quantity of metal may be estimated without converting it into a sulphat by the following data: 100 parts of lead dissolved in nitric acid, and decomposed by dropping in muriatic acid as long as any turbidness ensued, and evaporated to perfect driness (but short of volatilization of any part of the combined muriatic acid) produced 133 of muriat of lead; and consequently 100 parts of dry muriat of lead indicate 75. 2 nearly of metallic lead, and (if oxygenated in the same degree as in the sulphat) 4,89 of oxygen, or 80,09 of oxyd of lead. The muriat of lead may also be reduced by dissolving it in water, and immersing a rod of iron, whereby the lead will be precipitated in the metallic state in fine tamellæ.

3. *Oxyds of Lead, and their various uses in arts, manufactures and commerce.*—Lead is the least sonorous of all the metals, giving when shrunk, a very flat, heavy sound. It melts long before being red hot. The melting part has been variously given, owing to the known irregularity of the mercurial thermometers at very high temperatures. Morveau gives it at 590°. Mr. Crichton at 612°. When slowly cooled it crystallizes in quadrangular pyramids. Heated fully to redness it smokes and sublimes in the open air, giving a grey oxyd, which settles on the sides of the vessel that contains it; or, if in large quantity, mixes with the atmosphere around, and collects in the chimnies of the furnaces where it is melted.

Lead in all forms and combinations is poisonous when taken in any quantity, and a frequent exposure to its vapour, or much handling it, gradually produces dangerous bowel complaints, paralytic symptoms and other maladies.

Though the surface of lead at a common temperature soon tarnishes, this metal will remain exposed to air and all weathers for a great length of time without further change, the oxydated surface protecting the inner part from destruction; and hence the durability of leaden roofs, pipes,

&c. yet in process of years the whole becomes thoroughly eroded. Water has but little direct action on this metal either hot or cold, not being decomposed by it as it is by iron and some other metals: but it slowly assists the action of the air, for lead becomes corroded sooner in a damp than in a dry atmosphere.

When lead is melted in free exposure to the air, it becomes almost immediately covered with a wrinkled pellicle of a dirty grey colour, and if this be skimmed off, others form in succession, till the whole metal is changed into a yellowish-grey oxyd, the weight of which was one of the earliest observations made on the effect of calcination in increasing the weight of metals. This grey oxyd, by a further continuance of heat with constant stirring, passes through various shades of a greenish-yellow to a deep dun-yellow, owing to a successive absorption of oxygen. The highest state of oxygenation to be produced by a mere calcination has a beautiful high red colour with more or less scarlet; where the oxyd is called minium or read lead, a substance well known as a pigment, and especially as a flux in glass-making, for which last it is largely employed.

Minium, however, cannot be made with any certainty in the small way by mere calcination in the air, whatever length of time this may be continued, the colour of the oxyd never rising higher than a dun-yellow: it is only produced in manufactories in the large way by frequent stirring. The process is thus described by Dr. Watson, in his Chemical Essays, as employed in Derbyshire. The furnace is very much like a baker's oven with a low vaulted roof, and on each side of the furnace are two party walls rising from the floor of the surface, but not reaching to the roof. In the interval between these walls, and the sides of the furnace, the coal is burned, and the flame draws over the top of the party walls, and striking the roof is thence reflected down upon the surface of a quantity of lead which is laid on the floor of the furnace. The metal soon melts and instantly becomes covered with a pellicle which is sucessively raked off till the whole is changed into a greenish-yellow powder. This is taken out, ground in a mill, and washed to separate the portion of lead that still remains in the metallic state, by which it becomes an uniform yellow colour, and is then thrown back into the furnace and constantly stirred, so that every part may be equally exposed to the action of the flame, and in about forty-eight hours of calcination it is converted into red-lead.

In Holywell redlead is made from litharge, which saves the previous calcination.

We have stated that the oxyd of lead becomes yellow before it turns red. The substance called Massicot, and used as a yellow pigment, is generally made of this yellow oxyd, but the finer sorts of Massicot are said to have an addition of muriat of ammonia, and therefore to be a muriated oxyd of lead, not essentially different from that fine oxyd called Naples yellow.

Litharge is another of the oxyds of lead, made by the simple action of heat and air. It is produced in the process of extracting silver from lead. The silver holding lead is put into a large shallow dish made of ashes, and therefore very porous, and is kept till red-hot in a wind-furnace, at the back of which enters the pipe of large bellows that directs a blast of air on the surface of the red-hot metal. This converts it into a scaly yellowish-white glistening oxyd, which is raked off successively to expose new surfaces till nearly the whole of the lead is thus changed into litharge. There are slight variations in the colour of litharge, some kinds having more of a silvery gloss, others being of a dull red-yellow. Part of it is again reduced into very pure and soft lead, and the rest is selected for sale. The waste of lead by volatilization (a waste that takes place in the formation of all oxyds produced by a strong heat) is many times more in reducing lead into litharge than into minium, so that, though there is a large gain of oxygen from the air, the litharge weighs considerably less than the lead from which it was produced. Part of it, however, is lost by soaking into the test, a porous vessel in which it is made.

All the oxyds of lead, when strongly heated to a full redness, very readily ran into a glass which has a clear topal-yellow colour, and is the most powerful flux known of every vitrifiable matter, so that in a very short time the vitrified oxyd corrodes all the common crucibles and runs through them like a sieve, and even the closest porcelain can only retain it for a time.

There is another oxyd of this metal generally known by the name of the brown oxyd, which was first discovered by Scheele, and has various peculiar qualities. It is procured by adding nitric acid to minium. It is a tasteless powder of a flea-brown colour, very fine and light.

There is also an artificial white carbonat of lead produced by decomposing any of the salts of this metal by a carbonated alkali.

Lead is soluble in moist acids. All the salts have a sweetish taste, and are strongly styptic or astringent in the mouth. The muriat of lead or the salt produced by a solution in muriatic acid was termed by the older chemists *plumbum corneum* in analogy with the corresponding salt from silver denominated *luna cornea*.

From the carbonic acid employed as a solvent is produced *cerusse* or white lead, which is a carbonated oxyd; this metal is usually prepared in the first process of making acitite of lead. This is sometimes said to be an acetous oxyd, an acetite or subacitite of lead, but not with perfect correctness: for though the acetous acid is the means of its formation, this last will not dissolve lead when in close vessels; but with access of air it first oxydates it and then dissolves the oxyd. Or the solution may be obtained by adding oxyd of lead or carbonated oxyd to vinegar, and digesting for a time. For the preparation of cerusse or white lead in the larger way, see the article CERUSSA. *Acetite* or sugar of lead is prepared nearly in the same manner as the cerusse, by means of lead sheets put into pots with vinegar, and digested a sufficient time. It may also be made by dissolving cerusse or litharge in vinegar, and probably the natural carbonat may answer the same purpose.

The alkaline earths also dissolve the oxyds of lead: lime-water boiled for a long time on litharge forms a solution which has been long known as a recipe for blackening hair and other animal materials. When evaporated in a close vessel it deposits small transparent crystals of lime with oxyd of lead. This solution is decomposed by the alkaline sulphats and muriats, and also by sulphurated hydrogen.

The fat oils dissolve the oxyds of lead with great ease, and undergo a remarkable change in

hensive; not embellished: as, a lean dissertation.

Lean. *s.* That part of flesh which consists of the muscle without the fat (*Farquhar*).

Leander. See Hero.

LE'ANLY. *ad.* (from *lean.*) Meagrely; without plumpness.

LE'ANNESS. *s.* (from *lean.*) 1. Extenuation of body; want of flesh; meagreness. (*Ben Johnson*). 2. Want of matter; thinness; poverty (*Shakspeare*).

LEAO, in mineralogy. See Lazulus.

To LEAP. *v. n.* (hleapan, Saxon.) 1. To jump; to move upward or progressively without change of the feet (*Cowley*). 2. To rush with vehemence (*Sandys*). 3. To bound; to spring (*Luke*). 4. To fly; to start (*Shaks.*)

To Leap. *v. a.* 1. To pass over, or into, by leaping (*Prior*). 2. To compress, as beasts (*Dryden*).

Leap. *s.* (from the verb.) 1. Bound; jump; act of leaping. 2. Space passed by leaping. *L'Estrange.* 3. Sudden transition (*Swift*). 4. An assault of an animal of prey (*L'Estr.*) 5. Embrace of animals (*Dryden*). 6. Hazard, or effect of leaping (*Dryden*).

Leap, in music, is properly applicable to any disjunct degree, but is generally used to signify a distance consisting of several intermediate intervals.

LEAP-FROG. *s.* (*leap* and *frog.*) A play of children in which they imitate the jump of frogs (*Shakspeare*).

LEAP-YEAR. *s.* *Leap-year* or bissextile is every fourth year, and so called from its leaping a day more that year than in a common year: so that the common year hath 365 days, but the leap-year 366; and then February hath 29 days, which in common years hath but 28. See Bissextile, Chronology, and Year.

LEAR, the name of a British king, said in old chronicles to have succeeded his father Bladud, about A.M. 3160. The story of this king and his three daughters is well known from Shakspeare's excellent tragedy founded upon it.

LEARCHUS, a son of Athamas and Ino, crushed to death against a wall by his father, in a fit of madness.

To LEARN. *v. a.* (leopnian, Saxon.) 1. To gain the knowledge or skill of (*Knolles*). 2. To teach: obsolete (*Shakspeare*).

To Learn. *v. n.* To take pattern (*Bacon*).

LE'ARNED. *a.* (from *learn.*) 1. Versed in science and literature (*Swift*). 2. Skilled; skillful; knowing (*Granville*). 3. Skilled in scholastic knowledge (*Locke*).

LE'ARNEDLY. *ad.* (from *learned.*) With knowledge; with skill (*Hooker*).

LE'ARNING. *s.* (from *learn.*) 1. Literature; skill in language or sciences; generally scholastic knowledge (*Prior*). 2. Skill in any thing good or bad (*Hooker*).

LE'ARNER. *s.* (from *learn.*) One who is yet in his rudiments; one who is acquiring some new art or knowledge (*Graunt*).

LEASE (from the French *laiser*, *demitere*, "to let)" in law, otherwise called a *Demise*, is a conveyance or letting of lands or tenements, in consideration of rent, or other annual recompence made for life, for years, or at will; but always for a less time than the interest of the lessor in the premises; for if it were of the whole interest, it would be more properly an assignment. He that demises or lets, is the lessor; and he to whom it is demised or let is the lessee.

A lease may either be made by writing or word of mouth, called in law, a lease by parol. The former is most usual; but by the statute of frauds, 29 Charles II. c. 3, all leases of lands, except leases not exceeding three years, must be made in writing, and signed by the parties themselves, or their agents duly authorized, otherwise they will operate only as leases at will. If a lease is but for half a year, or a quarter, or less time the lessee is respected as a tenant for years; a year being the shortest term of which the law in this case, takes notice: that is, he is entitled to the general privileges of a tenant for years, and is classed as such, though his term lasts only for the time specified.

To constitute a good lease, there must be a lessor not restrained from making the lease to the extent for which it is granted; a lessee capable of receiving it; and the interest demised must be a demisable interest, and be sufficiently and properly described. If it is for years, it must have a certain commencement and determination; it is to have all the usual ceremonies, as sealing, delivery, &c.; and there must be an acceptance of the thing demised.

Leases were formerly only to a sort of bailiffs, who tilled the land, and paid a part of the profits to the landlord; they were for very short terms, and the tenant's estate was little respected in the law. They are now granted for long terms, and are very beneficial interests.

The following points may be necessary to be specified here concerning leases. First, they must have a certain commencement and end. Leases for life must not be made to commence at a future day, and there must be a livery of seisin. They must now be stamped as a lease, to be valid; and any form of writing will constitute a lease, provided it contains words of present demise, or actual letting; but if it be only an agreement to let, it conveys no immediate title in law, but only an equitable right to have a lease, or to sue at law for not making one. If a lease is made to one for years, and at the same time to another for a longer time, the last lease is not void, but shall take effect after the first expires. A tenant for life can, in general, only grant a lease to endure during his life; but sometimes a power is annexed to such an estate, to grant leases for a specified time, and under particular limitations, all which must be strictly complied with, or the lease is void; and in-

stances have happened, where building-leases have been set aside, and persons ruined by having granted under-leases. An infant may make a lease, but may set it aside when he comes of age; and the Court of Chancery is empowered to grant leases for idiots, lunatics, infants and married women.

The rent must be reserved to the executor or the heir of the lessor, according as his estate is real or personal. Lessees are bound to repair, unless the contrary is specified; and although if the house is burnt by accident they are not bound to rebuild, yet they must if the fire be by negligence; and if there is a covenant to pay rent, and a covenant to repair, except in case of fire, yet rent is payable, although the house is not rebuilt by the landlord. If there is a covenant not to assign, lease, or under-let, without licence of the landlord, the tenant cannot even grant an under-lease.

Upon a lease at will, six months' notice to quit must generally be given by either party, to determine on the same day in the year when the lease commenced. Leases made by spiritual persons of their church-lands, must be strictly conformable to certain statutes called the enabling and disabling statutes. The tenant may, at the trial of an ejectment, insist upon his notice to quit being insufficient, although he made no objection when it was served. See further *Jacob's Law Dictionary*, title Leases.

Lease and *Release*, a conveyance of the fee simple, right, or interest, in lands or tenements, under the statute of uses, 27 Henry VIII. c. 10, giving first the possession, and afterwards the interest, which in law is equivalent to a feoffment. It was invented to supply the place of livery of seisin, and is thus contrived; a lease, or rather bargain and sale, upon some pecuniary consideration, for one year, is made by the tenant of the freehold to the lessee or purchaser, which vests in him the use of the term for a year; and then the statute of uses, 27 Henry VIII. c. 10, immediately transfers the use into possession. He therefore, being thus in possession, is capable of receiving a release of the freehold in reversion; and accordingly, the next day a release is granted to him. In the lease, a pepper-corn is a good consideration to make the lessee capable of receiving a release. This mode of conveyance is become so usual, that it merits peculiar attention. See this matter very ably discussed by the annotator of the latter part of Coke's Commentaries, page 271, No. I.

Leases, *value of*. The purchaser of a lease may be considered as the purchaser of an annuity equal to the rack-rent of the estate; and the same principles, from which are deduced the present value of annuities to continue during any given term, will apply to the value of leases. The sum paid down for the grant of a lease is so much money paid in advance for the annual rents, as they may become due; or, it may be considered as a sum which put out to interest, will enable the lessor to repay himself the rack-rent of the estate, or the yearly value of his interest therein, during the given term; therefore no more money should be demanded by the lessor, for the grant of the lease, than will enable him to do this at a given rate of interest. In order to find what this sum should be it would be necessary to ascertain separately the present value of each annual rent, or the sum which, put out to interest at the given rate, will enable the landlord to repay himself the several yearly rents as they become due. Thus, if a person has 100l. due to him a twelvemonths hence, and he wishes to have the value of the same advanced immediately, the sum that ought to be given as an equivalent thereto, allowing 5 per cent. interest, is 95l. 4s. 9½.; for this is the sum which, put out to interest at the rate of 5 per cent., will, at the end of the year, amount to 100l. So also, if a person has 100l. due to him at the end of two years, and he wishes to have the value advanced immediately, the sum that ought to be given as an equivalent thereto, is 90ls. 14s. ½d. for this is the sum which put out at the same rate of interest, will, at the end of two years amount to 100l. In the same manner, if a person has 100l. due to him, at the end of three years, and he wishes to have the value of the same immediately, the sum that ought to be given as an equivalent thereto, is 86l. 7s. 8d. for this is the sum which put out at the same rate of interest, will, at the end of three years, amount to 100l. And if these three values are added together, they amount to 272l. 6s. 6d. which is the sum that ought to be paid down for the lease of an estate for three years, of the annual rent of 100l. Had the rate of interest been 6 per cent. or any higher rate, the answer would have come out less than the value above given; or, had it been 4 per cent. or any lower rate, the answer would have come out more than such value; whence it is obvious, that, in purchases of this kind, we ought previously to determine the rate of interest at which we are disposed to lay out our money.

Leases are frequently granted during a life, or for a specified term of years subject to termination, if a given life or lives should fail or become extinct within such term; sometimes they depend on the longest of two or three lives, with liberty on the failure of one or more of the lives, to nominate others on payment of a fine. College and corporation leases are often of these kinds; and are almost as often estimated erroneously. The values of such leases, however, are correctly exhibited in a very useful collection of "Tables for the purchasing and renewing of Leases," by F. Baily, of the Stock Exchange.

To LEASE. *v. a.* (from the noun.) To let by lease (*Ayliffe*).

To Lease. *v. n.* (*lesen*, Dutch.) To glean; to gather what the harvest men leave (*Dryden*).

LE'ASER. *s.* (from *lease.*) Gleaner; gatherer after the reaper (*Swift*).

LEASH. *s.* (*lêsse*, French; *letse*, Dutch.) 1. A leather throng, by which a falconer holds his hawk, or a courser leads his greyhounds (*Shakspeare*). 2. A tierce; three: as a brace is two (*Hudibras*). 3. A band wherewith to tie any thing in general (*Dennis*).

To LEASH. *v. a.* (from the noun.) To bind; to hold in a string (*Shakspeare*).

LE'ASING. *s.* (leaſe, Saxon.) Lies, falsehood (*Prior*).

LEAST. *a.* the superlative of little. (læſt, Saxon.) Little beyond others; smallest (*Locke*).

Least. *ad.* In the lowest degree; in a degree below others (*Pope*).

At Least.
At the Least.
At LE'ASTWISE.
To say no more; not to demand or affirm more than is barely sufficient; at the lowest degree (*Milton. Hooker*).

LE'ASY. *a.* Flimsy; of weak texture: not in use (*Ascham*).

LE'ATHER. *s.* (leðeр, Saxon.) 1. Dressed hides of animals (*Shakspeare*). 2. Skin: ironically (*Swift*).

Leather. The dressed hides or skins of animals:—the preparation of which for the many important purposes to which they are applied is almost exclusively a chemical process in all its branches. These branches we shall therefore notice at some length.

By converting skins into leather various important points are attained: putrefaction is prevented, the material is rendered strong, tough and durable; and in many instances moisture is bid complete defiance to. The recent skin consists principally of the true cutis or membranous texture, the chemical composition of which is gelatin in a dense state, but still entirely soluble in water more or less easily according to its density. This however is penetrated with different vessels for blood, lymph, oil, &c. some of the contents of which must of necessity remain after the death of the animal, and is covered on the outside with the insensible article to which is attached the exterior covering of air, wool, fur, and the like. The chemical composition of the article and its investing hairy covering, appears to be condensed albumen insoluble in water, and nearly incapable of putrefaction, but readily separable from the true skin by slight mechanical violence after the adhesion has been weakened by incipient fermentation or putrefaction, or the chemical action of lime, alkalies, or acids.

Hence the first step in all the processes for making leather consists in separating from the cutis adhering impurities and foreign matters, the animal juices retained in its pores, and the cuticle with its hairy covering, except in a very few cases in which the latter is purposely left on. The true skin being thus obtained nearly pure, and its texture so far opened as readily to imbibe any substance in which it is macerated, is then converted into leather by different methods, of which there are two quite distinct from each other; namely that of *tanning*, or impregnating it with the peculiar vegetable matter called tan; and *tawing*, in which it imbibes alum and other salts, and afterwards some soluble animal matter, such as the white of egg and sometimes blood. These two processes are also sometimes combined, by first tawing and then finishing with a slight tanning.

A large portion of the tanned leather also undergoes the further operation of *currying*, or imbuing with oil of some kind with much manual labour, in order to render it supple, flexible, and still more impenetrable by water.

As familiar examples of each we may observe that the thick sole-leather of shoes is tanned; the white kid-leather, as it is called, for fine gloves is tawed; the upper-leather for boots and shoes is tanned and curried; and the fine Turkey leather is tawed and afterwards finished with a slight tanning.

Tanned leather. The process of tanning varies considerably, not only in different countries, but even in different parts of the same country. The following is the method most approved and practised in London and its vacinity. The leather consisists chiefly of three sorts, known by the name of *butts* or *backs*, *hides*, and *skins*. Butts are generally made from the stoutest and heaviest ox hides, and are managed as follows: After the horns are taken off, the hides are laid smooth in heaps for one or two days in the summer, and for five or six in the winter: they are then hung on poles, in a close room called a smoke-house, in which is kept a smouldering fire of wet tan; this occasions a small degree of putrefaction, by which means the air is easily got off, by spreading the hide on a sort of wooden horse or beam, and scraping it with a crooked knife. The hair being taken off, the hide is thrown into a pit or pool of water to cleanse it from the dirt, &c. which being done, the hide is again spread on the wooden beam, and the grease, loose flesh, extraneous filth, &c. carefully scrubbed out or taken off; the hides are then put into a pit of strong liquor called ooze or wooze, prepared in pits called letches or taps kept for the purpose, by infusing ground bark in water; this is termed colouring: after which they are removed into another pit called a scowering, which consists of water strongly impregnated with vitriolic acid, or with a vegetable acid prepared from rye or barley. This operation (which is called raising), by distending the pores of the hides, occasions them more readily to imbibe the ooze, the effect of which is to astringe and condense the fibres, and give firmness to the leather. The hides are then taken out of the scowering, and spread smooth in a pit commonly filled with water, called a binder, with a quantity of ground bark strewed between each.

After lying a month or six weeks, they are taken up, and the decayed bark and liquor being drawn out of the pit, it is filled again with strong ooze, when they are put in as before, with bark between each hide. They now lie two or three months, at the expiration of which the same operation is repeated; they then remain four or five months, when they again undergo the same process; and after being three months in the last pit, are completely tanned, unless the hides are so remarkably stout as to want an additional pit or layer. The whole process requires from eleven to eighteen months, and sometimes two years, according to the substance of the hide, and dis-

cretion of the tanner. When taken out of the pit to be dried, they are hung upon poles; and after being compressed by a steel pin, and beat out smooth by wooden hammers called beetles, the operation is complete; and when thoroughly dry they are fit for sale Butts are chiefly used for the soles of stout shoes.

The leather which goes under the denomination of *hides* is generally made from cow hides, or the lighter ox hides, which are thus managed. After the horns are taken off, and the hides washed, they are put into a pit of water saturated with lime, where they remain a few days, when they are taken out, and the hair scraped off on a wooden beam, as before described, they are then washed in a pit or pool of water, and the loose flesh, &c. being taken off, they are removed into a pit of weak ooze, where they are taken up and put down (which is technically termed handling) two or three times a day for the first week: every second or third day they are shifted into a pit of fresh ooze, somewhat stronger than the former, till at the end of a month or six weeks, they are put into a strong ooze, in which they are handled once or twice a week with fresh bark for two or three months. They are then removed into another pit, called a layer, in which they are laid smooth, with bark ground very fine, strewed between each hide. After remaining here two or three months, they are generally taken up, when the ooze is drawn out, and the hides put in again with fresh ooze and fresh bark; where after laying two or three months more, they are completely tanned, except a few very stout hides, which may require an extra layer: they are then taken out, hung on poles, and being hammered and smoothed by a steel pin, are, when dry, fit for sale. These hides are called crop hides; they are from ten to eighteen months in tanning, and are used for the soles of shoes.

Skins, is the general term for the cutis of calves, seals, hogs, dogs, &c. These, after being washed in water, are put in lime-pits, as before mentioned, where they are taken up and put down every third or fourth day, for a fortnight or three weeks, in order to dilate the pores and dissolve the gelatinous parts of the skin. The hair is then scraped off, and the flesh and excrescences being removed, they are put into a pit of water impregnated with pigeon-dung (called a gainer or mastring), forming a strong alkaline ley, which in a week or ten days, soaking out the lime, grease, and saponaceous matter (during which period they are several times scraped over with a crooked knife to work out the dirt and filth), softens the skins, and prepares them for the reception of the ooze. They are then put into a pit of weak ooze, in the same manner as the hides, and being frequently handled, are by degrees removed into a stronger and still stronger liquor, for a month or six weeks, when they are put into a very strong ooze, with fresh bark ground very fine, and at the end of two or three months, according to their substance, are sufficiently tanned; when they are taken out, hung on poles, dried and fit for sale. These skins are afterwards dressed and blacked by the currier; and are used for the upper-leathers of shoes, boots, &c. The lighter sort of hides, called dressing-hides, as well as horse-hides, are managed nearly in the same manner as skins; and are used for coach-work, harness-work, &c.

Such is the process commonly used in this country, or at least commonly used till of late. But a process of a more scientific nature, and entitled to practical attention as being far more speedy in its affect, was a few years since invented by Mr. Seguin, and is gradually raising itself upon the ruins of the old routine. In order to explain this new process it is necessary to attend to the following facts.

Skins swell up, and become soft by moisture, which renders them permeable to water. Hence they are easily destroyed by the putrid process which ensues, and they become dry and brittle when the moisture is evaporated. Accident, no doubt, occasioned the discovery of the means of preventing these inconveniences by the use of certain vegetable substances, particularly the bark of oak. It was seen that skins prepared with these substances acquired new properties; that without losing their flexibility they became less permeable to water; more firm, more compact, and in some measure incapable of putrefaction. These observations gave birth to the art of the tanner. This art, no doubt of high antiquity, because founded on one of the earliest wants of man in society, comprehends a succession of processes which was executed by habit and imitation, without a knowledge of the essential objects. The preparation of skins accordingly required several years, and frequently, in spite of the care, expense, and slowness of the operation, the tanning, was incomplete; the skin formed a soft and porous leather, which was soon destroyed by moisture. These defects essentially sprung from ignorance of the true principles of this operation, because no discovery had been made respecting the action of tan upon the skin, and the circumstances, or conditions, which might accelerate or retard the process.

To arrive at this knowledge in an accurate manner, it is necessary to consider, first, the nature and properties of tan, and secondly, the structure and composition of the skin. We shall not enter into the detail of such precautions as are requisite in the choice of oak bark, the time and manner of separating it from the tree, preserving it, or pulverising it. It will be sufficient for our object to remark, that water poured into a vessel upon tan acquires, after some hours infusion, at the common temperature of the atmosphere, a brown colour, an astringent taste, and becomes charged with the most soluble substances contained in the tan; that by drawing off the water, and adding a similar quantity to the tan repeatedly, the whole of the soluble parts may be successively extracted, the water ceases to acquire colour, and there remains in the tub a mere fibrous matter, or parenchymatous texture, insoluble in water, and no longer adapted to promote the operation of tanning. This residue is therefore always rejected in the manufactories as useless. It is only used by gardeners for their hot-beds, but might probably be advantageously applied in the fabrication of coarse paper.

It is therefore in the water of infusion, or the lixiviations of tan, that we must seek for the soluble substances which alone are efficacious in tanning. On examination of the water of the last filtration, it is found to be not only clearer, less impregnated and less acrid than the water of the first lixiviation, but likewise that it possesses all the properties of the gallic acid. It reddens the infusion of tournsol, acts upon metallic solutions, and more particularly it precipitates a black fecula from sulphat of iron, &c. And it is also found that a piece of fresh skin, divested of its fat and sanguine humours, and macerated

in this liquor, instead of becoming compact, is softened and swells up.

The liquor of the first lixiviation exhibits a very different character. It is more coloured and astringent; it not only exhibits the properties of the gallic acid, by the alterations it causes in the blue colours of vegetables, and the black precipitate it forms with the sulphat of iron; but it likewise possesses the remarkable quality of forming, with animal gelatine, or glue, a yellowish abundant precipitate, insoluble in water, not putrescible, which becomes hard and brittle by drying; and if a piece of skin properly prepared be immersed in this fluid, it becomes gradually more compact, and is converted into leather.

There exist, therefore, in the same fluid, two very different substances: the one, which precipitates a black matter from iron, is the gallic acid or principle; the other, which precipitates animal gelatine or glue, is called the tanning principle, on account of its efficacy in the preparation of leather.

To leave no doubt on this important point, it was proved by a number of experiments easy to be repeated. 1. That the liquor of the last lixiviation, though coloured, and of an astringent taste, affords no precipitate with glue; a fact, which seems to shew that the gallic acid contained in the bark is less soluble than the tanning principle. In fact, as has already been remarked, when water is successively poured on the tan, an infusion is at last obtained which no longer precipitates glue, though it precipitates sulphat of iron very well. 2. The liquor of the first lixiviation, after having been saturated with glue or animal gelatine, and forming an abundant precipitate with that substance, is entirely deprived of the tanning principle. It no longer differs from the liquor of the last filtrations, and contains merely a portion of the gallic acid. Hence the addition of sulphat of iron affords a new precipitate with this liquor. 3. As the tanning principle has a strong attraction to the animal gelatine, with which it always forms an insoluble precipitate, this property affords a very convenient re-agent to ascertain its presence immediately in any fluid, and to determine with precision its quantity. Accordingly, the infusion of tan poured into milk, whey, serum, broth, &c. forms with these liquors, a precipitate more or less abundant, according to the quantity of gelatine they contain.

This peculiar property of the tanning principle affords an application which may become of great importance in the art of treating diseases, to determine the nature of urine, and to ascertain some of its changes. In the healthy subject, all whose functions are duly exercised, the urine does not contain gelatine, nor afford a precipitate with the infusion of tan: on the contrary, in all the gastric affections, the urine is more or less charged with gelatine, and forms, with the infusion of tan, a precipitate more or less abundant. The same observation is applicable to acute and chronical diseases, in which the assimilating or digestive forces are troubled, deranged, or perverted. 4. The gallic acid, or, if other terms be preferred, the principle which precipitates the sulphat of iron, is often found alone, or at least without being accompanied by the tanning principle. Thus, quinquina, crude or torrefied coffee, the roots of the strawberry-plant, scrofularia, milfoil, arnica, the flowers of Roman camomile, and all the multitude of plants vaguely comprised under the title of astringents, contain the gallic acid only. All these form with the sulphat of iron a precipitate more or less coloured and abundant; but none of them produce the slightest change in the solution of animal glue. On the contrary, the tanning principle has never been found alone, but always united or combined with the gallic principle. It was long supposed to exist exclusively in the oak, the nut-gall, and sumac, the only substances used at the tan-works; but it is found more or less abundantly in the siliquastrum, the rose-tree, the larix, several species of pines, the acacias, the lotus, the squill, the roots of bistort, of rhubarb, of parella, and several other plants, We have also found this principle in the products of distillation of different vegetable substances, where it was in some measure formed during the operation.

From these different considerations, founded on experiment, the following general principles may be deduced: 1. Every substance of which the infusion is capable of precipitating animal jelly, possesses the tanning property. 2. Every substance which possesses the tanning property, likewise precipitates the sulphat of iron black. 3. Every substance which precipitates the sulphat of iron, but not the solution of glue, does not possess the tanning property.

These are the principles which form the basis of M. Seguin's new practice, and in coincidence with the principles a patent was some years since taken out by Mr. W. Desmond, who obtains the tanning principle by digesting oak-bark, or other proper material, in cold water, in an apparatus nearly similar to that used in the salt-petre works. That is to say, the water which has remained upon the powdered bark for a certain time, in one vessel, is drawn off by a cock, and poured upon fresh tan. This is again to be drawn off, and poured upon other fresh tan; and in this way the process is to be continued to the fifth vessel. The liquor is then highly coloured, and marks, as Mr. Desmond says, from six to eight degrees on the hydrometer for salts. He calls this the tanning lixivium. The criterion to distinguish the presence of the tanning principle is, that it precipitates glue from its aqueous solution; and the lixivium is also useful to examine how far other vegetable substances, as well as oak-bark, may be suitable to the purpose of tanning. The strong tanning liquor is to be kept by itself. It is found, by trials with the glue, that the tanning principle of the first digester which receives the clear water, is, of course, first exhausted; but the same tan will still give a certain portion of the astringent principle, or gallic lixivium, to water. The presence of this principle is ascertained by its striking a black colour when added to a small quantity of the solution of vitriol of iron, or green copperas. As soon as the water from the digester ceases to exhibit this sign, the tan is exhausted, and must be replaced with new. The gallic lixivium is reserved for the purpose of taking the hair off from hides. Strong hides, after washing, cleaning, and fleshing, in the usual way, are to be immersed for two or three days in a mixture of gallic lixivium, and a thousandth part, by measure of dense vitriolic acid. By this means the hair is detatched from the hides, so that it may be scraped off with a round knife. When swelling or raising is required, the hides are to be immersed for ten or twelve hours in another vat, filled with water, and one five-hundreth part of the same vitriolic acid. The hides being then re-

peatedly washed and dressed are ready for tanning; for which purpose they are to be immersed for some hours in a weak tanning lixivium, of only one or two degrees; to obtain which, the latter portions of the infusions are set apart, or else some of that which has been partly exhausted by use in tanning. The hides are then to be put into a stronger lixivium, where, in a few days, they will be brought to the same degree of saturation with the liquor in which the are immersed. The strength of the liquor will by this means be considerably diminished, and must therefore be renewed. When the hides are by this means completely saturated, that is to say, perfectly tanned, they are to be removed, and slowly dried in the shade. Calf-skins, goat-skins, and the like, are to be steeped in lime-water, after the usual fleshing and washing. These are to remain in the lime-water, which contains more lime than it can dissolve, and requires to be stirred several times a-day. After two or three days, the skins are to be removed, and perfectly cleared of their lime by washing and pressing in water. The tanning process is then to be accomplished in the same manner as for the strong hides; but the lixivium must be considerably weaker. Mr. Desmond remarks, that lime is used instead of the gallic lixivium for such hides as are required to have a close grain; because, the acid mixed with that lixivium always swells the skins more or less: but that it cannot, with the same convenience, be used with thick skins, on account of the considerable labour required to clear them of the lime; any part of which, if left, would render them harsh, and liable to crack. He recommends, likewise, as the best method to bring the whole surface of the hides in contact with the lixivium, that they should be suspended vertically in the fluid, by means of transverse rods or bars, at such a distance as not to touch each other. By this practice, much of the labour of turning and handling may be saved. Mr. Desmond concludes his specification by observing, that in some cases it will be expedient to mix fresh tan with the lixivium; and that various modifications of strength, and other circumstances, will present themselves to the operator. He affirms that, in addition to the great saving of time and labour in this method, the leather, beng more completely tanned, will weigh heavier, wear better, and be less susceptible of moisture, than leather tanned in the usual way; that cords, ropes, and cables, made of hemp or speartery, impregnated with the tanning principle, will support much greater weights without breaking, be less liable to be worn out by friction, and will run more smoothly on pullies; insomuch that, in his opinion, it will render the use of tar in many cases, particularly in the rigging of ships, unnecessary; and, lastly, that it may be substituted for the preservation of animal food instead of salt. The intelligent manufacturer will readily perceive, that this new method is grounded on two particular circumstances, besides a more scientific management of the general process than has been usual. The first consists in the method of determining the presence and quantity of the tanning principle, by the hydrometer, and the precipitation of glue: the second, in applying this principle, in a concentrated state, more early in point of time than has, perhaps, been hitherto done. Our tanners, after the common previous processes, and unhairing by acids, by lime, or by piling the hides that they may heat and begin to putrify, apply the solution of tan, which they call ooze, in a great number of pits in the tanyard. They begin with the weakest solution, which has been used, and is of a lighter colour than the other; and they pass the hides, according to their judgment and experience, into oozes which are stronger and stronger; until at last, in certain cases, the hides come to be buried, for a certain time, in a solid mass of tan, or oak-bark. The oak-bark itself, in the pits, is not only the source from which the water extracts the tanning principle, but seems, likewise, in some measure, during the last stages of the process, to operate mechanically, by keeping the surfaces of the hides from touching each other.

How far this presumed improvement upon M. Seguin may answer we are not competent to determine: but as to M. Seguin's method itself there can be no doubt that it materially shortens the previous mode of tanning, and that very perfect leather has been produced by it. From the way in which the oozes are made, they must of necessity contain much more tan in proportion to extract and other vegetable matter than where the bark itself is suffered to remain in substance along with the one and skin for many months; as the tan is by far the most soluble of all the substances that are to be extracted by water, so that bark may be readily exhausted of tan, long before the extract resin, gallic acid, and other materials are got out. It is however affirmed, and we are affraid with some truth, that the leather prepared in this new method is less durable and more brittle than in the old way.

The only improvement that we are aware has since been introduced into the modern practice is that of using the weaker oozes warm, by which the skin is sooner penetrated with it, and a considerable saving of time is accomplished.

A very valuable series of experiments, however, have been entered into in regard to an artificial tannin substance that possesses the chief characteristic properties of tanning, or the tanning principles by Mr. Charles Hatchett which will be found given at large in the Philosophical Trans. for 1805, 1806, in which the ingenious experimentor seems very fairly to have established that there are few animal, vegetable, or even mineral substances of the inflammable class but what may be induced to yield a principle similar to that of tannin by the use either of sulphuric or nitric acid, and, what is of still higher consequence that the residuum or exhausted bark of the tan-pits being dried and roasted, and then moistened with diluted nitric acid (which must be softened to evaporate not much exceeding 300° till the bark becomes perfectly dry, on being digested in water will again yield a considerable proportion of tannin in a yellowish brown liquor that will abundantly precipitate gelatin: a process that may be repeated time after time, and with equal success till the whole of the bark has been converted into the tanning substance. But we shall have occasion to return to this subject in discussing the separate article TANNIN.

Tawed and *Dressed-leather*. All these are for the most part obtained from the lighter and more delicate skins of lambs, sheep, goats, and calves. Though there is no little difference between the dressing of shamoy-leather, alum-leather, Hungary leather, Morocco leather, parchment, and tanning; yet the skins which pass through the hands of the several workmen, ought to be for the most part, at least washed clean from blood and impurities in a running water; set to drain

worked with the hands, or pounded with wooden pestles in a vat; put into the pit (which is a hole lined either with wood, or with stone and mortar, filled with water in which quick-lime is dissolved) in order to loosen the hair, that it may be easily rubbed off without injuring the skin; drawn out, and set to drain on the edge of the pit; stretched on the leg or horse, in order to have the hair scraped off with a blunt iron knife, or wooden cylinder: the membranes on the fleshy side, and the scabs or roughness on the grain side, pared off with a sharp knife, and the skins rubbed with a whetstone, to take off any particles of the lime, or any thing else that may occasion hardness; thickened by different sorts of powder, whereby they become greater in bulk, and so much lighter, as gradually to rise to the surface of the water; stretched out green or half dried, and piled one over another; or put up separate after they are dried, and hung out to hair upon poles, lines, or any other way: which must be repeatedly done in the dressing of small skins. This alternate transition from the liquid of the air into that of water, and from water into the air, with the assistance of lime, salts, and oils, opens to the inmost fibres of the skin so effectually, as greatly to facilitate the introduction of substances proper for making them pliant without rendering them thinner.

In all these processes the grand point is thoroughly to cleanse the kind of skin employed, and to reduce it to as purified a state as possibe, in which state it is called a *pelt*, and is fit for any subsequent operation of tawing or dyeing, or oil-dressing or shammoying.

If the pelts be to be tawed, they are put into a solution of alum and salt in warm water, in the proportion of about three pounds of alum and four pounds of salt to every 120 middle sized skins, and worked about therein till they have absorbed a sufficient quantity. This again gives the skin a remarkable degree of thickness and toughness. The skins are then taken out and washed in water, and then put into a vat of bran and water, and allowed to ferment for a time till much of the alum and salt is got out, and the unusual thickening produced by it is for the most part reduced. They are then taken to a lofty room with a stove in the middle, and stretched on hooks, and kept there till fully dry. The skins are then converted into a tough flexible, and quite white leather; but to give them a glossy finish, and to take off the harshness of feel still remaining, they are again soaked in water to extract more of the salt and put into a large pail, containing the yolks of eggs beat up with water. Here the skins are for a long time trodden, by which they so completely imbibe the substance of the egg that the supernatant liquor is rendered almost perfectly limpid; after this they are hung up in a loft to dry, and are finished by glossing with a warm iron. The essential difference therefore between *tanning* and *tawing* consists in this, that in the former case the pelt is combined with tan and other vegetable matters, and in the latter with something that it imbibes from the alum and salt (possibly alumine), and which certainly is never again extracted by the subsequent washing and branning.

Curried and *Shammoyed Leather*. The common mode of currying leather for boots, shoes, &c. consists in first softening the hides as they come from the tan-pit, partly by soaking in water, partly by mechanical means, and then impregnating it with some kind of oil, by which means it is rendered much more impervious by moisture, and proper to protect the feet from the inclemency of the seasons. The process is briefly as follows. The hide is first soaked thoroughly in water, then placed on a polished wooden beam with the flesh-side outwards, and pared with a broad sharp knife till all the inequalities are removed and it is reduced to the requisite thinness. It is then again washed and rubbed with a polished stone, and while still wet, is besmeared with currier's oil, generally fish-oil, or a mixture of this and tallow. When hung up to dry the moisture evaporates, and the oil, which cannot be dissipated by mere exposure, gradually takes the place of the moisture, and penetrates deeply into the pores of the leather. It is then dried either in the sun or in a stoved room.

Blackening the leather is also a part of the currier's business, which is done on the grain-side simply by rubbing with an iron liquor, but on the flesh-side with a mixture of lamp-black and oil.

Shammoyed Leather, is generally sheep or doe-skin, prepared in the way mentioned for alum and tawed leather, and died if necessary, and then finished in oil. This forms the common wash leather, breeches leather, &c. and is the only kind which, when dyed will bear washing without the colour being materially injured.

Dyed Leather. The colours given to leather are various, sometimes dependant upon mere fancy, and sometimes upon real utility; and the materials employed are various, according to the country in which the process takes place.

English Morocco leather prepared from sheep-skins chiefly, and used so largely for coach-linings, pocket-books, and the best kind of book-binding is thus made. The skin cleansed and worked in the way already described, is taken from the lime-water, and the thickening thereby occasioned is brought down, not by tan-liquor as in tawing, but by a bath of dog's or pigeon's dung diffused in water, where it remains till sufficiently supplied, and the lime is quite got out, and it becomes a perfectly white, clean pelt. If intended to be dyed red it is then sewed up very tight in the form of a sack with the grain-side outwards (the dye only being required on this side) and is immersed in a cochineal bath of a warmth just equal to what the hand can support, and is worked about for a sufficient time till it is uniformly dyed, a process that demands much skill and experience. The sack is then put into a large vat, containing sumach infused in warm water, and kept for some hours till it is sufficiently tanned. The skins intended to be blacked are merely sumached without any previous dyeing. The skins thus coloured are dried and polished as follows. They are first stretched very tight upon a smooth inclined board and rubbed over with a little oil to supple them. Those intended for black leather are previously rubbed over with an iron liquor by means of a stiff brush, which uniting with the gallic acid of the sumach instantly strikes a deep and uniform black, they are then rubbed by hand with a ball of glass cut into a polygonal surface, with much manual labour, which polishes them and makes them very firm and compact. Lastly they are grained or ribbed by rubbing the grained surface of the leather very strongly with a ball of box-wood, round the centre of which a number of small equidistant parallel grooves are cut in forming an equal num-

ber of narrow ridges, the friction of which gives the leather the desired inequality of surface.

In the process for making *real* Morocco leather, the skins after coming from the bran are thrown into a second bath made of white figs mixed with water, which is thereby rendered slimy and fermentable. In this bath they remain four or five days, when they are thoroughly salted with sal-gem (or rock-salt) alone, and not with salt and alum; after which they are fit to receive the dye, which for the red is cochineal and alum, and for the yellow, pomegranate bark and alum. The skins are then tanned, dressed, supplied with a little oil, and dried.

Much excellent leather, and of various dyes is manufactured in different parts of Russia; for the peculiar processes of which we much refer the reader to Mr. Tooke's "View of the Russian Empire," vol. iii. p. 514. The *saffian* or manoquin, which is prepared largely at Astracan, is manufactured only from bucks' and goats' skins; and the usual colours are red and yellow. The *shagreen* which is also manufactured at Astracan, consists only of horse's, or ass's hides; and, of these, only of a small part cut from the crupper line along the back, in a semicircular form, about thirty-four inches upon the crupper, and twenty-eight along the back. The chief dyes are green, black and blue.

We shall just notice the substances from which the more common colours are obtained among ourselves, and the mode of applying them.

A blue is given by immersing the skin for the space of twenty-four hours in urine and indigo, after which it is boiled in alum; or this colour may be communicated by tempering the indigo with red wine, and steeping the skins in the mixture.

A red colour is obtained, by first washing the skins, which are then soaked for the space of two hours in galls, wrung out, and immersed in a liquor prepared by a solution of privet (*Ligustrum vulgare*, L.), alum, and verdigrease in water; when they are steeped in a dye made of Brazil-wood boiled with ley.—In order to communicate a purple, the skins are wetted with a solution of Roman alum in warm water; and when dry, they are rubbed by the hand with a decoction of logwood in cold water.

Leather acquires a light-green tinge by applying to it sap-green diluted with boiled alum-water:—a dark-green cast is communicated by means of steel-filings and sal ammoniac, steeped in urine for a considerable time, and well rubbed into the skin, which is then to be dried in the shade.

A yellow colour is given, by annointing the skin with a decoction of aloes and linseed-oil, previously strained; or, by immersing it in a solution of dyer's green-weed. Lastly, if fustic-berries be boiled in alum-water, and the skins dipped in the liquor, they will acquire a light-orange shade; but, if a deeper hue be required, it will be necessary to substitute turmeric for the berries.

Water-proof-leather. Leather being an article of extensive utility, especially for shoes and boots, various processes have been contrived for rendering it water-proof. These generally consist in an additional dressing of some oily or resinous matter.

In the 2d vol. of Medical Inquiries and Observations (8vo. Philadelphia, 1793), Dr. Rush states the following mixture to be eminently calculated for rendering shoes, &c. impermeable to water. One pound of linseed-oil, eight ounces of mutton suet, six-ounces of bees'-wax, and four ounces of resin, are to be melted together; and, while moderately warm, to be applied both to the upper leather, and the soles of boots.—Dr. Rush remarks that this cheap recipe was taken from The Complete Fisherman, a work published during the reign of Queen Elizabeth; and has, for many years, been employed with great success by the fishermen in America.

A patent was granted in 1794 to Mr. John Bellamy, for his new invented method of making all kinds of leather water-proof.—For this purpose, the patentee has contrived two compositions, which are prepared in the following manner:

First method: One gallon of nut-oil, and an equal quantity of poppy-oil, are to be mixed with three gallons of linseed-oil; or, one gallon of nut, or poppy-oil, may be added to three of that expressed from linseed: or, two gallons of the latter may be combined with one pint of nut, and a similar quantity of poppy-oil. These ingredients (in the proportions above mentioned, or such as the nature of the oil may require) are to be poured together in an iron-pot, and placed over a gentle fire: to each gallon of oil must be allowed one pound of white copperas, sugar of lead, colcothar, or any other drying substance. The whole is to remain for the space of six or seven hours over such a degree of heat, as it will bear without rising, till it becomes sufficiently dry; when it may be taken off; and, as soon as it is cool, the compound will be fit for use

Second method: Gum resin, one pound; pitch, half a pound; tar and turpentine, of each four ounces, are to be added to one gallon of the oils prepared according to the first method: these ingredients are to be well mixed with the oils, first by gently heating the whole mass, then increasing the fire, till the whole become thoroughly incorporated.—The patentee specifies various proportions, in which the ingredients may be used; but experience will be the best guide to ascertain them. When the oils, prepared conformably to the first method, or the gums, &c. according to the second, are sufficiently cool, Mr. Bellamy directs a brush to be dipped in the preparation, which should be rubbed into the leather. As soon as that article is thoroughly impregnated, it ought to be laid on an even board, and the superfluous matter removed from its surface. With respect to sole leather, or similar thick substances, he observes, that they should first be gently warmed; the composition is to be applied till they are fully saturated; and, after being properly dried in a warm place, they will be ready for use.

In the Memoirs of the Academy of Sciences of Turin, for 1789, we meet with an interesting communication by M. de St. Real; on the means of rendering leather (especially that destined for soles) impermeable to water, without diminishing its strength.—This object, he conceives, may be effected, without any alteration in the usual method of tanning by the common operations of currying; provided the skins be compressed in certain heavy rollers, after being previously immersed in beef-fat, or oil. The additional greasing, and pressing, will not greatly increase the price of sole leather; which, after being a whole year in tanning imbibes water in a much smaller proportion, than cow-leather, when dressed with fat.—We regret that our limits do not permit u to specify the very ingenious experiments mad

by M. de St. Real; as we are convinced they will contribute to improve the art of tanning.

Another method of preventing leather from being penetrated by water, consists in exposing it with the flesh-side towards the fire: after which, a coat of warmed tar is to be applied with a proper brush, three or four times successively, according to the thickness of the leather, till the liquid matter penetrate through the whole skin. The durability and strength of shoes, &c. will be considerably increased, if, in laying on the last coat of tar, they be sprinkled over with a small quantity of fine iron-filings, which will, in a manner, fill up the pores of the leather. Lastly, shoes may be rendered impermeable to moisture, by occasionally rubbing the soles with hot tar: thus the feet may be preserved dry and warm; an important object in this climate, especially during the winter season.

On subjects connected with this article, the reader may advantageously consult many of the volumes of the Repertory of Arts, as well as of the Retrospect of Arts and Manufactures.

LE'ATHERDRESSER. *s.* (*leather* and *dresser.*) He who prepares leather; he who manufactures hides for use (*Pope*).

LE'ATHER-EATER, in entomology. See Dermestes.

LE'ATHERLY, or Leatherlike. See Coriaceous.

LE'ATHER-MOUTHED. *a.* (*leather* and *mouth.*) By a *leather-mouthed* fish, I mean such as have their teeth in their throat; as the chub, or cheven, barbel (*Walton*).

LE'ATHERN. *a.* (from *leather.*) Made of leather (*Philips*).

LE'ATHERSELLER. *s.* (*leather* and *seller.*) He who deals in leather.

LE'ATHERWOOD, in botany. See Dirca.

LEAVE. *s.* (leve, Saxon.) 1. Grant of liberty; permission; allowance (*Pope*). 2. Farewell; adieu (*Shakspeare*).

To LEAVE. *v. a.* pret. *I left; I have left.* 1. To quit; to forsake (*Ben Jonson*). 2. To desert; to abandon (*Ecclus*). 3. To have remaining at death (*Ecclus*). 4. Not to deprive of (*Taylor*). 5. To suffer to remain (*Bacon*). 6. Not to carry away (*Knolles*). 7. To reject; not to choose (*Steele*). 8. To fix as a token of remembrance (*Locke*). 9. To bequeath; to give as inheritance (*Dry.*) 10. To give up; to resign (*Leviticus*). 11. To permit without interposition (*Locke*). 12. To cease to do; to desist from (*Samuel*). 13. to leave off; to desist from; to forbear (*Addison*). 14. To leave off; to forsake (*Arbuthnot*). 15. To leave out; to omit; to neglect (*Addison*).

To LEAVE. *v. n.* 1. To cease; to desist (*Shakspeare*). 2. To leave off; to desist (*Knolles*). 3. To leave off; to stop (*Daniel*).

To Leave. *v. a.* (*lever*, French.) To levy; to raise: a corrupt word (*Spenser*).

LE'AVED. *a.* (from *leaves*, of *leaf.*) 1. Furnished with foliage. 2. Made with leaves or folds (*Isaiah*).

LEAVEN, strictly signifies *sour dough*, which acquires its acidity, when preserved after kneading flour with yeast, in order to ferment a larger quantity of paste.—It is a very imperfect substitute for yeast; and, as it communicates to the bread an astringent taste which few persons relish, it ought to be used only where barm cannot be procured. See Baking, Barm, Bread.

To LE'AVEN. *v. a* (from the noun.) 1. To ferment by something mixed (*Shaks.*) 2. To taint; to imbue (*Prior*).

LE'AVER. *s.* (from *leave.*) One who deserts or forsakes (*Shakspeare*).

Leaver, in mechanics. See Lever.

LEAVES. *s.* The plural of *leaf.*

LE'AVINGS. *s.* (from *leave.*) Remnant; relicks; offal; refuse (*Addison*).

LE'AVY. *a.* (from *leaf.*) Full of leaves; covered with leaves (*Sidney*).

LEBADEA, a town of Bœotia, near Mount Helicon. It received this name from the mother of Aspledon, and became famous for the oracle and cave of Trophonius (*Strab.*)

LEBECHIA. In botany, a genus of the class diadelphia; order decandria. Calyx five-parted with acute divisions and rounded cavities; legume cylindrical, many-seeded. Eight species; all papilionaceous, Cape plants, with red or fuleous flowers.

LECH. *v. n.* (*lecher*, French.) To lick over (*Shakspeare*).

LECHEA. In botany, a genus of the class triandria; order trigynia. Calyx three-leaved; petals three, linear; capsule three-celled, three-valved, with the same number of inner ones: seed one. Four species: two of India, two of America: all herbaceous plants.

LE'CHER. *s.* A whoremaster (*Pope*).

To LE'CHER. *v. a.* (from the noun.) To whore (*Shakspeare*).

LE'CHEROUS. *a.* (from *lecher.*) Lewd, lustful (*Derham*).

LE'CHEROUSLY. *ad.* Lewdly; lustfully.

LE'CHEROUSNESS. *s.* (from *lecherous.*) Lewdness.

LE'CHERY. *s.* (from *lecher.*) Lewdness; lust (*Ascham*).

LECHLADE, a town in Gloucestershire, with a market on Tuesday; seated at the confluence of the river Lech with the Thames. A canal from the Severn joins the Thames near this town. It is 28 miles E. by S. of Gloucester, and 77 W. by N. of London. Lon. 1. 35. W. Lat. 51. 40. N.

LECHNICH, a town of Germany, in the circle of the Lower Rhine, and in the electorate of Cologne. Long. 6. 35. E. Lat. 50. 40. N.

LECTI, beds or couches, were of two kinds amongst the Romans, as being destined to two different uses, to lie upon at entertainments, and to repose upon for nightly rest. The first were called *lecti tricliniares*, the other *lecti cubicularii*. See Beds.

LECTICA, was a litter or vehicle, in which the Romans were carried. It was of two kinds, covered and uncovered. The covered lectica is called by Pliny *cubiculum viatorum*,

a traveller's bed-chamber: and indeed we are informed that Augustus frequently ordered his servants to stop his litter that he might sleep upon the road. This vehicle was carried by six or eight men called *lecticarii.*

LE'CTION. *s.* (*lectio*, Latin.) A reading; a variety in copies (*Watts*).

LE'CTURE. *s.* (*lecture*, French.) 1. A discourse pronounced upon any subject (*Sidney*. *Taylor*). 2. The act or practice of reading; perusal (*Brown*). 3. A magisterial reprimand; a pedantic discourse (*Addison*).

To LE'CTURE. *v. a.* (from the noun.) 1. To instruct formally. 2. To instruct insolently and dogmatically.

To Le'cture. *v. n.* To read in public; to instruct an audience by a formal explanation or discourse.

LE'CTURER. *s.* (from *lecture.*) 1. An instructor; a teacher by way of lecture. 2. A preacher in a church hired by the parish to assist the rector or vicar (*Clarendon*).

LE'CTURESHIP. *s.* (from *lecture.*) The office of a lecturer (*Swift*).

LECYTHIS. In botany a genus of the class polyandria; order monogynia. Calyx six-leaved; petals six; nectary, tongue-shaped, bearing the stamens; pericarp opening transversely all round, many seeded. Eight species—all South American plants; trees or shrubs with alternate leaves.

LED. The part. pret. of *lead.*

LEDA, in fabulous history, a daughter of king Thespius and Eurythemis, married Tyndarus, king of Sparta. Being seen bathing in the river Eurotas by Jupiter, a few days after in her pregnancy, the god, struck with her beauty, resolved to deceive her. He persuaded Venus to change herself into an eagle, while he assumed the form of a swan, and, after this metamorphosis, Jupiter, as if fearful of the cruelty of the bird of prey, fled to the arms of Leda, who willingly sheltered the trembling swan. The caresses with which Leda received the swan, enabled Jupiter to avail himself of his situation, and in nine months after she brought forth two eggs, from one of which sprang Pollux and Helena, and from the other Castor and Clytemnestra. The two former were deemed the offspring of Jupiter, and the others claimed Tyndarus for their father. Homer and Hesiod make no mention of the metamorphosis of Jupiter into a swan (*Apollod.*)

LEDBURY, a town of Herefordshire in England. It is a well-built town seated on a rich clay soil, and inhabited mostly by clothiers, who carry on a pretty large trade. Long. 2. 17. W. Lat. 52. 4. N.

LEDESMA, an ancient and strong town of Spain, in the kingdom of Leon, seated on the river Tome. Long. 5. 25. W. Lat. 41. 2. N.

LEDGE. *s.* (*leggen*, Dutch.) 1. A row; layer; stratum (*Watton*). 2. A ridge rising above the rest, or projecting beyond the rest (*Swift*). 3. Any prominence, or rising part (*Dryden*).

LE'DGER, the principal book wherein merchants enter their accounts. See Book-keeping.

LE'DGER-LINES. In music, those lines which are added above or beneath the five composing the stave, for the reception of such notes as are too high, or too low, to be placed upon or within it.

LEDHORSE, a sumpter horse.

LEDON, in botany. See Cistus.

LEDUM. March-cistus; wild rosemary. In botany a genus of the class decandria; order, monogynia. Calyx five-cleft; corol flat, five-parted; capsule five-celled, opening at the base. Three species—north of Europe, and Carolina. One species is said by some botanists to be produced in Yorkshire and other counties of England, with a strawberry-like flower: but it is questionable whether the plant thus referred to belongs to this genus.

LE DRAN (Henry Francis), a famous French surgeon, who died in 1770, aged 85 years. His works are, 1. Parallele des Differentes Manières de tirer la Pierra de la Vessie, 1730; 2. Observations de la Chirurgie, 2 vols. 12mo.; 3. Traité des Opérations de Chirurgie, 8vo.; 4. Réflexions sur Plaies d'armes à feu, 12mo.; 5. Consultations sur la plupart des maladies qui sont du ressort de la Chirurgie, 8vo.; 6. Traité Economique de l'Anatomie des Corps humain, 8vo. (*Watkins*).

LEE, a term in navigation, signifying that side, or quarter, towards which the wind blows.

Lee-way, of a ship, is the angle made by the point of the compass steered upon, and the real line of the ship's way, occasioned by contrary winds and a rough sea.

All ships are apt to make some lee-way; so that in casting up the log-board, something must be allowed for lee-way. But the lee-way made by different ships, under the same circumstances of wind and sails, will be different; and even the same ship, with different lading, and having more or less sail abroad, will make more or less lee-way. The ordinary rules of allowing for it are these: they were given by Mr. John Buckler to Mr. William Jones (Sir William Jones's father), who first published them about the year 1702.

1. When a ship is close-hauled, has all her sails set, the water smooth, and a moderate gale of wind, she is then supposed to make little or no lee-way. 2. Allow one point, when it blows so fresh that the small sails are taken in. 3. Allow two points, when the top-sail must be close reefed. 4. Allow two points and a half, when one top-sail must be handed. 5. Allow three points and a half, when both top-sails are to be taken in. 6. Allow four points, when the fore-course is handed. 7. Allow five points, when trying under the main sail only. 8.

Allow six points, when both main and fore-courses are taken in. 9. Allow seven points, when the ship tries a-hull, or all sails are handed. When the wind has blowed hard in either quarter, and shifts across the meridian into the next quarter, the lee-way will be lessened. But in all these cases, respect must be had to the roughness of the sea with the trim of the ship; and hence the mariner will be able to correct his course.

Lee, a village beautifully situated in Kent, near Blackheath. In the church-yard of this village the celebrated Dr. Halley is interred.

LEE (Nathaniel), a very eminent dramatic poet of the last century; was the son of a clergyman, who gave him a liberal education. He received his first rudiments of learning at Westminster School; from whence he went to Trinity College, Cambridge. Coming to London, however, his inclination prompted him to appear on the theatre; but he was not more successful in representing the thoughts of other men than many a genius besides, who have been equally unfortunate in treading the stage, although they knew so well how to write for it. He produced eleven tragedies, all of which contain a very great portion of true poetic enthusiasm. None, if any, ever felt the passion of love more truly; nor could any one describe it with more tenderness. Addison commends his genius highly; observing, that none of our English poets had a happier turn for tragedy, although his natural fire and unbridled impetuosity hurried him beyond all bounds of probability, and sometimes were quite out of nature. The truth is, this poet's imagination ran away with his reason; so that at length he became quite crazy; and grew so mad, that his friends were obliged to confine him in Bethlam, where he made that famous witty reply to a coxcomb scribbler, who had the cruelty to jeer him with his misfortune, by observing that it was an easy thing to write like a madman:—"No," said Lee, "it is not an easy thing to write like a madman; but it is very easy to write like a fool!" Lee had the good fortune to recover the use of his reason so far as to be discharged from his melancholy confinement; but he did not long survive his enlargement, dying at the early age of 34. Cibber, in his Lives of the Poets, says he perished unfortunately in a night-ramble in London streets. His Theodosius and Alexander the Great are stock plays, and to this day are often acted with great applause. The late Mr. Barry was particularly fortunate in the character of the Macedonian Hero.

LEEA. In botany, a genus of the class pentandria, order monogynia. Corol one-petalled; nectary one-leafed; five-cleft erect, placed on the tube of the corol; berry inferior, one-seeded. Three species—two indigeneous to India—a shrubby and herbaceous plant; one a native of the Cape.

LEECH, in helminthology. See Hirudo.

LEEDS, a town of England, in the county of York, situated on the river Aire, and on the great canal which is navagable from Liverpool. It is governed by a mayor, recorder, twelve aldermen, twenty-four common councilmen, &c. but sends no members to parliament. Leeds has been a long time famous for the woollen manufacture, and is one of the largest and most flourishing towns in the county, yet had but one church till the reign of Charles I. It now contains three, a Presbyterian meeting-house, erected in 1691, called the New Chapel, which is the stateliest, if not the oldest, of that denomination in the north of England; and in the town and suburbs several other places of worship. In 1786 the first stone of a general infirmary was laid at Leeds, and which is since finished. It is noted for some medicinal springs. Here are two magnificent halls, both built about the year 1714; one used for an assembly-room, the other is the guild, or moot-hall. Its increase of building, in the year 1786, was nearly 400 houses. The antiquity of Leeds is very great, but it was not incorporated till the reign of Charles the First. The manufacture and trade of Leeds are principally in cloth, the market for which is not perhaps to be equalled in the world. There are two spacious halls for the accommodation of the clothiers, and also a third hall, where worsted goods are exposed to sale. At about six o'clock in the summer, and about seven in the winter, the market bell rings; upon which, in a few minutes, without hurry, noise, or the least disorder, the whole market is filled, all the benches covered with cloth, as close to one another as the pieces can lie longways, each proprietor standing behind his own piece. As soon as the bell has ceased ringing, the factors and buyers of all sorts enter the hall, and walk up and down between the rows, as their occasions direct. When they have pitched upon their cloth, they lean over to the clothier, and by a whisper, in the fewest words imaginable, the price is stated; one asks, the other bids, and they agree or disagree in a moment. In a little more than an hour all the business is done, ten or twenty thousand pounds worth of cloth, and sometimes much more, are bought and sold with a whisper only; the laws of the market here being more strictly observed than at any place in England. On account of the trade, the rivers Aire and Calder were made navigable, at the expense of several private merchants, without calling in the assistance of the nobility and gentry. By this means a communication was opened from Leeds and Wakefield to York and Hull; so that all the woollen manufactures exported are carried by water to Hull. There is another trade in

this part of the country, become very considerable since the opening of the above navigation, which is the carriage of coals down from Wakefield and Leeds; near both which places there are inexhaustible stores. These are carried quite down into the Ouse, and then either up that river to York, or down to the Humber, where the Trent and Ouse meet together, and which in a few miles falls into the sea. The number of inhabitants of Leeds in 1800, was 53,162; and since that period the population has increased. Distance from York 22 miles; from London 192. Long. 1. 29. W. Lat. 53. 48. N.

LEEF. *a.* (*leve*, Dutch.) Kind, fond (*Spen.*)

LEEFOOGA, one of the Friendly Islands, in the South Pacific Ocean, visited by Captain Cook in 1776. Many parts of the country, near the sea, are sandy and barren; but in the internal parts, the marks of considerable population, and of an improved state of cultivation, are conspicuous. Many of the plantations are inclosed in such a manner, that the fences, running parallel to each other, form spacious public roads. Large spots, covered with the paper mulberry tree, were observed, and the plantations in general were abundantly stocked with plants and fruit trees. To these Captain Cook made some addition, by sowing the seeds of melons, Indian corn, &c. The island is seven miles in length; its breadth, in some places, is not above three.

LEEK, in botany. See ALLIUM.

LEEK, a town in Staffordshire, with a market on Wednesday; 18 miles north of Stafford, and 154 N. N. W. of London. Long. 1. 55. W. Lat. 53. 16. N.

LEER, or LEHR, a town of Westphalia, in East Friesland, on a river of the same name, which soon after falls into the Embs. It is 11 miles S. E. of Embden, and 24 W. N. W. of Oldenburg. Long. 7. 11. E. Lat. 53. 21. N.

LEER. *s.* (hleape, Saxon.) 1. An oblique view (*Milton*). 2. A laboured cast of countenance (*Swift*).

To LEER. *v. n.* (from the noun.) 1. To look obliquely; to look archly (*Swift*). 2. To look with a forced countenance (*Dryd.*)

LEERDAM, a town of the United Provinces, in Holland, seated on the Linghe, 17 miles N. E. of Dort. Long. 5. 13. E. Lat. 51. 56. N.

LEEROT, a fortress of Westphalia, in East Friesland, seated at the confluence of the Lee with the Embs, 10 miles E. by S. of Embden.

LEERS, or LIERS, a town of Westphalia, in the bishopric of Liege, near which a battle was fought on the 1st of October, 1746, between the allies, commanded by Prince Charles of Lorrain, and the French under Count Saxe. It is four miles N. of Liege.

LEERSIA. In botany, a genus of the class triandria; order digynia. Calyxless; glumus two-valved, closed. Four species—all American grasses; and one, L. oryzoides, common to Europe as well as America.

LEES, the grossest and most ponderous parts of liquors, which, being separated by fermentation, fall to the bottom. The word comes from the French *lie*; and that either from *limus*, "mud," or from *Lyeus* one of the surnames of Bacchus; or, according to Du Cange, from *lia*, a corrupt Latin word signifying the same. The vinegar-makers make a great trade of the lees of wine dried and made into cakes, after having squeezed out the remains of the liquor in presses.

To LEESE. *v. a.* To lose. This word is now nearly obsolete.

LEET, or COURT LEET (*leta visus franci plegii*), is a court of record, ordained for punishing offences against the crown; and is said to be the most ancient court of the land. It inquires of all offences under high treason; but those who are to be punished with loss of life or member, are only inquirable and presentable he e, and to be certified over to the justices of assize (Stat. 1. Edw. III.). And this court is called the view of frank pledge, because the king is to be there certified by the view of the steward, how many people are within every leet, and have an account of their good manners and government; and every person of the age of twelve years, who hath remained there for a year and a day, may be sworn to be faithful to the king, and the people are to be kept in peace, &c. A leet is incident to a hundred, as a court baron to a manor: for by grant of a hundred, a leet passeth; and a hundred cannot be without a leet.

LE'EWARD. *a.* (lee and peanb, Saxon.) Toward the wind (*Arbuthnot*).

LEEWARD ISLANDS, that part of the Caribbee Islands in the West Indies, commencing at Dominica, and extending to Porto Rico.

LEEWE, a fortified town of Austrian Brabant, seated on the Geete, 12 miles E. of Louvain. Long. 5. 7. E. Lat. 50. 53. N.

LEFT. The participle preter. of *leave*.

LEFT. *a.* (*lufte*, Dutch; *lævus*, Latin.) Sinistrous; not the right (*Dryden*).

LEFT-HANDED. *a.* (*left* and *hand*.) Using the left hand rather than the right (*Brown*).

LEFT-HANDEDNESS. *s.* (from *left-handed*.) Habitual use of the left-hand (*Donne*).

LEG, the lower extremity of animals, which serves both for their support and motion; it is generally divided into three parts; 1. the thigh; 2. the leg, properly so called; and, 3. the foot.

The human legs are subject to few complaints, except the common ulcers, the proper treatment of which we propose to state under that article. They are likewise apt to be sprained, fractured, or broken; in which cases great caution is requisite. See SURGERY, ANATOMY, &c.

LEG denotes 1. An act of obeisance; a bow

with the leg drawn back (*Hudibras*). 2. To stand on his own legs; to support himself (*Collier*). 3. That by which any thing is supported on the ground; as, the leg of a table.

LEGACY, is a bequest of a sum of money, or any personal effects of a testator, and these are to be paid by his representative, after all the debts of the deceased are discharged as far as the assets, or property liable to payment of debts and legacies, will extend. All the goods and chattels of the deceased are by law vested in the representative, who is bound to see whether there be left a sufficient fund to pay the debts of the testator, which, if it should prove inadequate, the pecuniary legacies must proportionably abate; a specific legacy, however, is not to abate unless there be insufficient without it to pay debts, that is, the general legacies must all be exhausted first. If the legatee die before the testator, it will in general be a lapsed legacy, and fall into the general fund, as it will also where it is given upon a contingency, as to A B, if he shall attain twenty-one. Where, however, from the general import of the will, it can be collected that the testator intended it a vested legacy, it will go to the representative of the deceased legatee. Thus, if a legacy is made payable, or to be paid, to the legatee at a certain age, and he die, under that age, it is a vested and transmissible interest in him; but it is otherwise if it is generally to him at or when he attains such age. If the legacy is to bear interest, it is vested though the words payable are omitted. So, if it is to A for life, and after the death of A to B, the legacy to B is vested in B upon the death of the testator, and will not lapse by the death of B in the lifetime of A.

In case of a vested legacy due immediately, and charged on land, or money in the funds, which yields an immediate profit, interest shall be payable from the death of the testator; but if it be charged on the personal estate only of the testator, which cannot be collected in, it will carry interest only from the end of the year after the death of the testator. A legacy to an infant ought not to be paid to his father; a legacy to a married woman can only be paid to her husband; and executors are not bound to pay a legacy without security to refund.

When all the debts and particular legacies are discharged, the residue or surplus must be paid to the residuary legatee, if any be so appointed in the will; but if there be none appointed or intended, it will go to the executor or next of kin. When this residue does not go to the executor, it is to be distributed among the intestates next of kin, according to the statute of distributions, except it is otherwise disposeable by particular customs, as those of London, York, &c. See Executor.

LE'GAL. *a.* (*legal*, French.) 1. Done or conceived according to law (*Hale*). 2. Lawful; not contrary to law (*Milton*).

LEGA'LITY. *s.* (*legalité*, French.) Lawfulness.

To LE'GALIZE. *v. a.* (*legaliser*, French.) To authorize; to make lawful (*South*).

LE'GALLY. *ad.* (from *legal.*) Lawfully; according to law (*Taylor*).

LE'GATARY. *s.* (*legataire*, French.) One who has a legacy left (*Ayliffe*).

LE'GATE, a cardinal or bishop, whom the pope sends as his ambassador to sovereign princes. See Ambassador. There are three kinds of legates, viz. legates *a latere*, legates *de latere*, and legates by office, or *legati nati*: of these the most considerable are the legates a latere, the next are the legates de latere. See the article Latere. Legates by office are those who have not any particular legation given them; but who, by virtue of their dignity and rank in the church, become legates: such are the archbishop of Rheims and Arles: but the authority of these legates is much inferior to that of the legates a latere. The power of a legate is sometimes given without the title. Some of the nuncios are invested with it.

LEGATEE, the person for whom a legacy is provided.

LE'GATINE. *a.* (from *legate.*) 1. Made by a legate (*Ayliffe*). 2. Belonging to a legate of the Roman see (*Shakspeare*).

LEGATION. *s.* (*legatio*, Latin.) Deputation; commission; embassy (*Wotton*).

LEGA'TOR. *s.* (from *lego*, Latin.) One who makes a will, and leaves legacies (*Dry.*)

LEGEND, any idle or ridiculous story told by the Romanists concerning their saints, and other persons, in order to support the credit of their religion. The legend was originally a book used in the old Romish churches, containing the lessons to be read at divine service; hence the lives of the saints and martyrs came to be called legends, because chapters were read out of them at matins, and at the refectories of religious houses. Among these the golden legend, which is a collection of the lives of the saints, was received in the church with great applause, which it maintained for 200 years; though it is so full of ridiculous and romantic stories, that the Romanists themselves are now ashamed of it.

Legend is also used by authors to signify the words or letters engraven about the margins, &c. of coins. Thus the legend of a French crown was, *sit nomen domini benedictum*; that of a moidore, *in hoc signo vinces*: on those of the last emperors of Constantinople, we find *Iesus Christus basileus basileon, ihs xps nika, Iesus Christus vincit.*

Legend is also applied to the inscription of medals, which serves to explain the figures or devices represented on them. In strictness, the legend differs from the in-

scription; this last properly signifying words placed on the reverse of a medal, in lieu of figures.

Every medal has properly two legends; that on the front, and that on the reverse. The first generally serves only to distinguish the person by his name, titles, offices, &c. the latter is intended to express his noble and virtuous sentiments, his good deeds, and the advantages the public has reaped by him. This, however, does not hold universally; for sometimes we find the titles shared between both sides, and sometimes also the legend.

LE'GER. *s.* (from *legger*, Dutch.) Any thing that lies in a place; as, *a* leger *ambassador, a resident*; a leger-*book*, a book that lies in the counting-house (*Shakspeare*).

LE'GERDEMAIN. *s.* (*legereté de main*, French.) Slight of hand; juggle; power of deceiving the eye by nimble motion; trick (*South*).

LEGE'RITY. *s.* (*legerité*, French.) Lightness; nimbleness: not in use (*Shakspeare*).

LE'GGED. *a.* (from *leg.*) Having legs; furnished with legs.

LEGHENICH, or Lechenich, a town of Germany, in the circle of Lower Rhine, and archbishopric of Cologne, 10 miles S. S. W. of Cologne, and 50 E. N. E. of Liege. Long. 6. 31. E. Lat. 50. 50. N.

LEGHORN, a strong and considerable city of Italy, in Tuscany. It has one of the best harbours in the Mediterranean; and, being a free port, its commerce is prodigious. The Jews have a handsome synagogue and schools, the Greeks and Armenians have churches of their own, and no religion is disturbed. The inhabitants are computed at 40,000. The streets are wide and straight, and almost all the houses of the same height. There are so many canals, that some have given it the title of New Venice. Near the harbour is a large building, in which they shut up every night the Turks and the galley-slaves. At a little distance is a lighthouse, on a small island. In 1741 this city suffered greatly by an earthquake. On June 27, 1796, it was entered by a French army, but the British subjects here, with their merchandize, and all the vessels in the harbour, previously departed. It is 10 miles S. of Pisa, 45 S. W. of Florence, and 145 N. W. of Rome. Long. 10. 17. E. Lat. 43. 34. N.

LE'GIBLE. *a.* (*legibilis*, Latin.) 1. Such as may be read (*Swift*). 2. Apparent; discoverable (*Collier*).

LE'GIBLY. *ad.* (from *legible.*) In such a manner as may be read.

LE'GION, in Roman antiquity, a corps of soldiers in the Roman armies, whose numbers were different at different times. The legion under Romulus consisted of 300 foot and 300 horse, and was soon after augmented to 4000, after the admission of the Sabines into the city. When Annibal was in Italy it consisted of 5000 soldiers, and afterwards it was decreased to 4000, or 4500. Marius made it consist of 6200, besides 700 horse. This was the period of its greatness in numbers. Livy speaks of ten, and even eighteen, legions kept at Rome. Each legion was divided into ten cohorts, each cohort into three manipuli, and every manipulus into three centuries or ordines. The chief commander of the legion was called legatus (lieutenant). For a more minute description of the legion, the reader is referred to *Lempriere's Dictionary*, or *Kennet's Antiquities*.

Legion is often employed to signify any great number.

LE'GIONARY. *a.* (from *legion.*) 1. Relating to a legion. 2. Containing a legion. 3. Containing a great indefinite number (*Brown*).

LEGISLA'TION. *s.* (from *legislator*, Lat.) The act of giving laws (*Littleton*).

LEGISLA'TIVE. *a.* (from *legislator.*) Giving laws; lawgiving (*Denham*).

LEGISLA'TOR (*lawgiver*, a person who frames the laws of a kingdom, or state, founded by him.

The principal ancient legislators are—Moses, legislator of the Hebrews; Mercurius Trismegistus, and Bocchyris, of the Egyptians; Italus, of the Œnotrians; Theseus, Draco, and Solon, of the Athenians; Zoroaster, of the Bactrians; Charondas, of the Cappadocians; and Charondas, or Phaleas, of the Carthaginians; Androdamas, of the Chalcidians; Eudoxus, of the Cnidians; Phido, of the Corinthians; Minos, of the Cretans; Pythagoras, of the Crotoniates, and most of the cities of the Græcia Major; Parmenides, and Zeno, of Elea, in Lucania; Xamolxis, of the Getæ; Phoroneus, of the Greeks; Bacchus, of the Indians; Saturn, of Italy; Macarius, of the Isle of Lesbos; Zaleucus, of the Locrians; Nicodorus Athleta, of the city of Mutina; Hippodamia, of Miletus; Charondas, of Rheggio; Lycurgus, of the Lacedemonians; Archytas, of Tarentum; Philolaus, of the Thebans.

At Rome the people were in a great measure their own legislators; though Solon may be said, in some sense, to have been their legislator, as the decemviri, who were created for the making of laws, borrowed a great number from those of Solon.

With us the legislative power is lodged in the king, lords, and commons assembled in parliament.

The first laws among the Athenians seem to have been those of Theseus; for what we can find earlier than this period is involved in fable. After Theseus came Draco the Archon, whose laws were said, for their severity, to have been written with blood; by his laws every offence was punished with death; so that stealing an apple, and betraying their country, were treated as equal crimes. These laws were afterwards repealed by Solon, except such as related to murder. By way of distinction, Draco's

laws were called Θεσμοι, and Solon's Νομοι. The laws of Solon were in a great measure suspended during the usurpation of Pisistratus; but, after the expulsion of his family, were revived with some additions by Clisthenes. After this, the form of government was again changed, first by the four hundred, and afterwards by the thirty tyrants; but these storms being over, the ancient laws were again restored in the archonship of Euclides, and others established at the instance of Diocles, Aristophon, and, last of all, of Demetrius the Phalerian. But many laws were enacted by the suffrages of the people on particular exigencies: the decrees of the senate continued to have the force of laws no longer than a year. If a new law was to be proposed to the assembly, it was necessary to write it upon a white tablet, and fix it up some days before the meeting, lest their judgment should be caught by surprize. The laws were carefully revised every year; and if any of them, from a change of circumstances, were found unsuitable or prejudicial, they were repealed: this was called επιχειροτονια των νομων, because the suffrages were given by holding up of hands. The first laws among the Grecians were unwritten and composed in verse, that the common people might with more ease commit them to memory. Solon penned his laws upon wooden tablets, called Αξονες; and some authors, with great probability, assert, that they were written in the manner called Βυστροφηδον, from left to right, and from right again to left, in the same manner as oxen walk the furrows in plowing, thus,

ΕΚΔΙΟΣ ΑΡ
.ΑΘΣΜΩΧ

It was against the law for any person to erase a decree, and certain persons called Γραμματεις were appointed to prevent any corruption; whose business it was also to transcribe the old and enter the new ones.

LEGISLA'TURE. *s.* (from *legislator*, Lat.) The power that makes laws (*Swift*).

LEGI'TIMACY. *s.* (from *legitimate.*) 1. Lawfulness of birth (*Ayliffe*). 2. Genuineness; not spuriousness (*Woodward*).

LEGI'TIMATE. *a.* (from *legitimus*, Latin; *legitime*, French.) Born in marriage; lawfully begotten (*Taylor*).

To LEGI'TIMATE. *v. a.* (*legitimer*, Fr.) 1. To procure to any the rights of legitimate birth (*Ayliffe*). 2. To make lawful (*Decay of Piety*).

LEGI'TIMATELY. *ad.* (from *legitimate.*) 1. Lawfully. 2. Genuinely (*Dryden*).

LEGITIMA'TION. *s.* (*legitimation*, Fr.) 1. Lawful birth (*Locke*). 2. The act of investing with the privileges of lawful birth.

LEGIUNCARA, a town of Naples, in the province of Bari, 21 miles N. W. of Matera.

LEGNAGO, a fortified town of Italy, in the Veronese. It surrendered to the French in 1796, and is seated on the Adige, 25 miles S. S. E. of Verona.

LEGNO'TIS. In botany, a genus of the class polyandria; order monogynia. Calyx five-cleft; petals five, inserted into the receptacle, jagged; capsule three-celled. Two species—one of Jamaica, the other of Guiana; both with axillary flowers.

LEGU'ME. In botany, *pericarpium bivalve, affigens semina secundum suturam alterum tantum.*—A pericarp of two valves, in which the seeds are fixed along one suture only. It is usually of a membranaceous texture, and commonly one-celled. Some legumes are two-celled; others jointed; others again divided transversely into several cells (*isthmis intercepta*), by contracting between the seeds.—The old English word was *cod:* and the legume of a pea is still called a *pea's-cod.*—Pod is used both for the legume and silique indifferently: but they are so distinct that they ought not to have the same appellation. It seems better, therefore, to anglicize the Latin terms: and with respect to this, it is become sufficiently familiar to the English ear. Dr. Withering calls it the shell.

LEGUMINOSÆ. In botany, leguminous plants. Such as have a legume for the pericarp. The same with the *papilionacei* of Tournefort. It is one of Ray's classes. The order decandria of the class diadelphia in Linnéus's system, contains these plants.

LEGU'MINOUS. *a.* (*legumineux*, French; from *legumen.*) Belonging to pulse; consisting of pulse (*Arbuthnot*).

LEIBNITZ, a town of Germany, in the duchy of Stiria, seated on the Sulm, 16 miles S. of Gratz.

LEIBNITZ (Godfrey William), an eminent mathematician and philosopher, was born at Leipsic in Saxony, in 1646. At the age of fifteen, he applied himself to mathematics at Leipsic and Jena; and in 1663, maintained a thesis *de Principiis Individuationis.* The year following he was admitted Master of Arts. He read with great attention the Greek philosophers; and endeavoured to reconcile Plato with Aristotle, as he afterwards did Aristotle with Des Cartes. But the study of the law was his principal view; in which faculty he was admitted bachelor in 1665. The year following he would have taken the degree of doctor, but was refused it on pretence that he was too young; though, in reality, because he had raised himself several enemies by rejecting the principles of Aristotle and the Schoolmen.

Upon this he repaired to Altorf, where he maintained a thesis *de Casibus Perplexis*, with such applause, that he had the degree of doctor conferred on him.

In 1672 he went to Paris, to manage some affairs at the French Court for the Baron Boinebourg. Here he became acquainted with all the literati, and made farther and considerable progress in the study of ma-

thematics and philosophy, chiefly, as he says, by the works of Pascal, Gregory St. Vincent, and Huygens. In this course, having observed the imperfection of Pascal's arithmetical machine, he invented a new one, as he called it, which was approved of by the minister Colbert, and the Academy of Sciences, in which he was offered a seat as a member, but refused the offers made to him, as it would have been necessary to embrace the Catholic religion.

In 1673 he came over to England, where he became acquainted with Mr. Oldenburg, secretary of the Royal Society, and Mr. John Collins, a distinguished member of the society; from whom it seems he received some hints of the method of fluxions, which had been invented in 1664 or 1665, by the then Mr. Isaac Newton.

The same year he returned to France, where he resided till 1676, when he again passed through England, and Holland, in his journey to Hanover, where he proposed to settle. Upon his arrival there, he applied himself to enrich the duke's library with the best books of all kinds. The duke dying in 1679, his successor, Ernest Augustus, then bishop of Osnaburgh, shewed Mr. Leibnitz the same favour as his predecessor had done, and engaged him to write the History of the House of Brunswick. To execute this task, he travelled over Germany and Italy, to collect materials. While he was in Italy, he met with a pleasant adventure, which might have proved a more serious affair: Passing in a small bark from Venice to Mesola, a storm arose; during which the pilot, imagining he was not understood by a German, whom, being a heretic, he looked on as the cause of the tempest, proposed to strip him of his clothes and money, and throw him overboard. Leibnitz hearing this, without discovering the least emotion, drew a set of beads from his pocket, and began turning them with great seeming devotion. The artifice succeeded; one of the sailors observing to the pilot, that, since the man was no heretic, he ought not to be drowned.

In 1700 he was admitted a member of the Royal Academy of Sciences at Paris. The same year the elector of Brandenburg, afterwards king of Prussia, founded an academy at Berlin by his advice; and he was appointed perpetual president, though his affairs would not permit him to reside constantly at that place. He projected an academy of the same kind at Dresden; and this design would have been executed, if it had not been prevented by the confusions in Poland. He was engaged likewise in a scheme for an universal language, and other literary projects. Indeed his writings had made him long before famous over all Europe, and he had many honours and rewards conferred on him. Beside the office of privy counsellor of justice, which the elector of Hanover had given him, the emperor appointed him, in 1711, aulic counsellor; and the czar made him privy counsellor of justice, with a pension of 1000 ducats. Leibnitz undertook at the same time to establish an academy of sciences at Vienna; but the plague prevented the execution of it. However, the emperor, as a mark of his favour, settled a pension on him of 2000 florins, and promised him one of 4000 if he would come and reside at Vienna; an offer he was inclined to comply with, but was prevented by his death.

Meanwhile, the History of Brunswick being interrupted by other works which he wrote occasionally, he found, at his return to Hanover in 1714, that the elector had appointed Mr. Eccard for his colleague in writing that history. The elector was then raised to the throne of Great Britain, which place Leibnitz visited the latter end of that year, when he received particular marks of friendship from the king, and was frequently at court. He now was engaged in a dispute with Dr. Samuel Clarke, upon the subjects of free-will, the reality of space, and other philosophical subjects. This was conducted with great candour and learning; and the papers, which were published by Clarke, will ever be esteemed by men of genius and learning. The controversy ended only with the death of Leibnitz, Nov. 14, 1716, which was occasioned by the gout and stone, in the 70th year of his age.

As to his character and person:—He was of a middle stature, and a thin habit of body. He had a studious air, and a sweet aspect, though near-sighted. He was indefatigably industrious to the end of his life. He ate and drank little. Hunger alone marked the time of his meals, and his diet was plain and strong. He had a very good memory, and it was said could repeat the Æneid from beginning to end. What he wanted to remember, he wrote down, and never read it afterwards. He always professed the Lutheran religion, but never went to sermons; and when in his last sickness his favourite servant desired to send for a minister, he would not permit it, saying he had no occasion for one. He was never married, nor ever attempted it but once, when he was about 50 years old; and the lady desiring time to consider of it, gave him an opportunity of doing the same: he used to say, "that marriage was a good thing, but a wise man ought to consider of it all his life."

Leibnitz was author of a great multitude of writings; several of which were published separately, and many others in the memoirs of different academies. He invented a binary arithmetic, and many other ingenious matters. His claim to the invention of Fluxions, has been spoken of under that article. Hanschius collected, with great care, every thing that Leibnitz had said, in different passages of his works, upon the principles of philosophy; and formed of

them a complete system, under the title of G. G. Leibnitzii Principia Philosophiæ more geometrico demonstrata, &c. 1728, in 4to. There came out a collection of our author's letters in 1734 and 1735, intitled, Epistolæ ad diversos theologici, juridici, medici, philosophici, mathematici, historici, et philologici argumenti e MSS. auctores: cum annotationibus suis primum divulgavit Christian Cortholtus. But all his works were collected, distributed into classes by M. Dutens, and published at Geneva in six large volumes 4to. in 1768, intitled, Gothofredi Guillelmi Leibnitii Opera Omnia, &c.

LEIBNITZIAN PHILOSOPHY, or the *Philosophy of Liebnitz*, is a system formed and published by its author in the last century, partly in emendation of the Cartesian, and partly in opposition to the Newtonian philosophy. In this philosophy, the author retained the Cartesian subtile matter, with the vortices and universal plenum; and he represented the universe as a machine that should proceed for ever, by the laws of mechanism, in the most perfect state, by an absolute inviolable necessity. After Newton's philosophy was published, in 1687, Leibnitz printed an Essay on the Celestial Motions in the Act. Erud. 1689, where he admits the circulation of the ether with Des Cartes, and of gravity with Newton; though he has not reconciled these principles, nor shewn how gravity arose from the impulse of this ether, nor how to account for the planetary revolutions in their respective orbits. His system is also defective, as it does not reconcile the circulation of the ether with the free motions of the comets in all directions, or with the obliquity of the planes of the planetary orbits; nor resolve other objections to which the hypothesis of the vortices and plenum is liable.

Soon after the period just mentioned, the dispute commenced concerning the invention of the method of Fluxions. which led Mr. Leibnitz to take a very decided part in opposition to the philosophy of Newton. From the goodness and wisdom of the Deity, and his principle of a sufficient reason, he concluded, that the universe was a perfect work, or the best that could possibly have been made; and that other things, which are evil or incommodious, were permitted as necessary consequences of what was best: that the material system, considered as a perfect machine, can never fall into disorder, or require to be set right; and to suppose that God interposes in it, is to lessen the skill of the author, and the perfection of his work. He expressly charges an impious tendency on the philosophy of Newton, because he asserts, that the fabric of the universe and course of nature could not continue for ever in its present state, but in process of time would require to be re-established or renewed by the hand of its first framer. The perfection of the universe, in consequence of which it is capable of continuing for ever by mechanical laws in its present state, led Mr. Leibnitz to distinguish between the quantity of motion and the force of bodies; and, whilst he owns in opposition to Des Cartes that the former varies, to maintain that the quantity of force is for ever the same in the universe; and to measure the forces of bodies by the squares of their velocities.

Mr. Leibnitz proposes two principles as the foundation of all our knowledge; the first, that it is impossible for a thing to be, and not to be at the same time, which he says is the foundation of speculative truth; and secondly, that nothing is without a sufficient reason why it should be so, rather than otherwise; and by this principle, he says, we make a transition from abstracted truths to natural philosophy. Hence he concludes that the mind is naturally determined, in its volitions and elections, by the greatest apparent good, and that it is impossible to make choice between things perfectly like, which he calls indiscernibles; from whence he infers, that two things perfectly like could not have been produced even by the Deity himself: and one reason why he rejects a vacuum, is because the parts of it must be supposed perfectly like to each other. For the same reason too, he rejects atoms, and all similar parts of matter; to each of which, though divisible *ad infinitum*, he ascribes a *monad* (Act. Lipsiæ 1698, pa. 435) or active kind of principle, endued with perception and appetite. The essence of substance he places in action or activity, or, as he expresses it, in something that is between acting and the faculty of acting. He affirms that absolute rest is impossible, and holds that motion, or a sort of *nisus*, is essential to all material substances. Each monad he describes as representative of the whole universe from its point of sight; and yet he tells us, in one of his letters, that matter is not a substance, but a *substantiatum*, or *phenomené bien fondé*. See also *Maclaurin's View of Newton's Philosophical Discoveries*, book 1, chap. 4. and *Pre-established* HARMONY.

LEICESTER, the capital of a county of the same name, in England, upon the river Leire, now called Soare. From its situation on the fosse-way, and the many coins and antiquities discovered here, it seems probable that it was a place of some note in the time of the Romans. In the time of the Saxons it was a bishop's see, and afterwards so repaired and fortified by Edelfiida, that it became, according to Matthew Paris, a most wealthy place, having 32 parish churches; but in Henry the Second's reign it was in a manner quite ruined, for joining in rebellion against him with Robert Earl of Leicester. In the reign of Edward III. however, it began to recover by the favour of his son Henry Plantagenet, duke and earl of Lancaster, who founded and endowed a collegiate church and hospital here. It is a

borough and corporation, governed by a mayor, recorder, steward, bailiff, 24 aldermen, 48 common councilmen, a solicitor, a town-clerk, and two chamberlains. It had its first charter from king John. The freemen are exempt from paying toll in all the fairs and markets of England. It has three hospitals, that mentioned above, built by Henry Plantagenet, duke of Lancaster, and capable of supporting 100 aged people decently; another erected and endowed in the reign of Henry VIII. for 12 poor lazars; and another for six poor widows. The castle was a prodigious large building, where the Duke of Lancaster kept his court. The hall and kitchen still remain entire, of which the former is very spacious and lofty: and in the tower over one of the gate-ways is kept the magazine for the county militia. There was a famous monastery here, anciently called, from its situation in the meadows, St. Mary de Pratis, or Prez. In these meadows is now the course for the horse-race. It is said that Richard III. who was killed at the battle of Bosworth, lies interred in St. Margaret's church. The chief business of Leicester is the stocking-trade, which has produced in general to the amount of 60,000l. a year. In a parliament held here in the reign of Henry V. the first law for the burning of heretics was made, levelled against the followers of Wickliffe, who was rector of Lutterworth, in this county, and where his pulpit is said still to remain. The town suffered greatly in the civil wars, by two sieges upon the back of one another. It has given the title of earl to several noble families.

Leicester has a large market on Saturdays, and four fairs in the year. In 1800 the number of inhabited houses was 3205, uninhabited houses 85; inhabitants 16,953; electors about 2340. Long. 1. 3. W. Lat. 52. 38. N.

LEICESTERSHIRE, an inland county of England, in form almost circular. It has Nottinghamshire and Derbyshire to the North; Rutlandshire and Lincolnshire on the east; Warwickshire on the West, from which it is parted by the Roman military way called Watling-street; and by Northamptonshire on the south; and is about 170 miles in circumference. As it lies at a great distance from the sea, and is free from bogs and marshes, the air is sweet and wholesome. It is a champaign country in general, and abundantly fertile in corn and grass, being watered by several rivers, as the Soure, or Sare, which passes through the middle of it, and abounds in excellent salmon and other fish; the Wreke, Trent, Eye, Sense, Auker, and Avon. These rivers being mostly navigable, greatly facilitate the trade of the county: there are also several canals. In some parts there is a great scarcity of fuel, both wood and coal; but in the more hilly parts there is plenty of both, together with great flocks of sheep. Besides wheat, barley, oats, and pease, it produces the best beans in England. They grow so tall and luxuriant in some places, particularly about Barton in the Beans, that they look, towards the harvest-time, like a forest; and the inhabitants eat them not only when they are green, as in other places, but all the year round; for which reason their neighbours nickname them *bean-bellies*. They have plenty of very good wool, of which they not only make great quantities of stockings, but send a great quantity unmanufactured into other parts of England. They make great profit of their corn and pulse; and likewise breed great numbers of coach and dray horses, most of the gentlemen being graziers; and it is not uncommon to rent grass farms from 500l. to 2000l. a-year. It is in the midland circuit, and diocese of Lincoln; and sends four members to parliament, two for Leicester, and two for the county.

Leicestershire contains about 560,000 acres of land, and 130,090 inhabitants, of whom about 26 000 are able to bear arms.

LEIGH, a town of England, in the county of Lancaster, which formerly had a market, but now neglected: 10 miles W. N. W. of Manchester, and 189 N. N. W. of London.

LEIGH, or LEA, a town of England, in the county of Essex, on the side of the river Thames: 21 miles E. S. E. of Billericay, and 39 E. of London.

LEIGHLIN, or OLD LEIGHLIN, a decayed town of Ireland. in the county of Carlow, the see of a bishop, founded in the 7th century, and united with Ferns in the year 1600; the cathedral serves for a parish church. It is a borough, and sent two members to the Irish Parliament: nine miles N. E. Kilkenny, and eight S. S. W. Carlow.

LEIGHLIN-BRIDGE, a town of Ireland, in the county of Carlow, situated on the river Barrow: seven miles S. Carlow, and eleven N. E. Kilkenny.

LEIGH'S-ISLAND, a small island on the south-east coast of New Ireland, a little to the south-east of Cocoa Nut Island.

LEIGHTON, or LEIGHTON-BUZZARD, or BEAUDESERT, a town of England, in the county of Bedford, situated on the river Ouzel, on the borders of Buckinghamshire, with a weekly market on Tuesday: seven miles and a half WNW. Dunstable, and forty-one NW. London. Lon. 0. 35. W. Lat. 51. 55. N.

LEIGHTON (Alexander), a Scotch presbyterian divine, born at Edinburgh in 1587, and memorable for the sufferings he underwent on account of some virulent libels which he published against Charles I. and the church of England. For these he had his nose slit, his ears cut off, and a public whipping inflicted on him. In 1640 the parliament appointed him keeper of Lambeth palace, which was converted into a state prison. He died insane in 1644.

Leighton (Robert), archbishop of Glasgow, was son of the preceding, and born at Edinburgh. He entered into orders, and became a most exemplary parish priest. His extraordinary merits recommended him to the magistrates of Edinburgh, who chose him president of their college. Soon after the restoration he was consecrated bishop of Dunblane, in which diocese he governed with great moderation, so that he was revered even by the greatest enemies of the episcopacy. The rest of the Scotch bishops acted in a different manner; on which despairing to see that church properly established he went to London, and resigned his bishopric. The king, however, obliged him to accept of the archbishopric of Glasgow, in which station he made another effort to moderate the violence of his brethren; but finding that all was in vain, he went to London and resigned his dignity. He then led a retired life in the county of Sussex, and died suddenly at an inn in London in 1684. The works of this excellent prelate are inestimable, particularly his Commentary on St. Peter.

LEINSTER, the eastern province of Ireland, which contains the twelve following counties, viz. Louth, Meath, Dublin, Wicklow, Wexford, Kilkenny, Carlow, Kildare, Queen's County, King's County. West Meath, and Longford. Leinster is bounded by Ulster on the north, by Connaught and Munster on the west and south-west, and by the sea on the south and east. Its length is 104 miles, the breadth about fifty-five miles, and the circuit 360 miles; and includes 992 parishes, one archbishopric, and three bishoprics. It is, in general, well cultivated, and enjoys good air and soil, and is the most populous, containing the capital and the seat of the government. The principal rivers are the Boyne, Barrow, Liffey, Noir, and May.

LEIPSIC, or Leipzig, a city of Germany, in the circle of Upper Saxony, and capital of a circle of the same name. This is one of the finest, and most celebrated towns in all Germany, situated in a pleasant and fertile plain, on the river Pleisse. Its circuit is estimated at 8954 paces; but the suburbs are well built, and large, and furnished with gardens. Between the town itself and the suburbs, a fine walk of lime trees was laid out, in the year 1702, which runs quite round the town. In the town ditches, also, are planted mulberry-trees. It is the seat of a very flourishing and famous university, which was founded and dedicated, in 1409, and consists of four nations, namely of the Misnian, Saxon, Bavarian or Franconian, and the Polish, and contains in it six colleges; as also, of two good Latin schools, and likewise, of two celebrated societies, as, namely, a German society, and another for the encouragement of the liberal arts, Leipzig is also one of the four towns where the contingents of the empire are paid in: and likewise, one of the principal trading towns in all Germany, inasmuch as it enjoys not only an important foreign trade, but also, at its three celebrated fairs, which are kept at Easter, Michaelmas, and the beginning of the new year, carries on a very extensive commerce, both in domestic and foreign wares. Leipsic is seated in a plain, between the rivers Saale and Mulde, near the confluence of the Pleysse, the Elster, and the Barde, 40 miles N. W. of Dresden. Lon. 12. 25. E. Lat. 51. 19. N.

LEIPOPSYCHIA (from λειπω to leave, and ψυχη the soul.) In medicine, syncope, swooning.

LEIPOTHYMIA, (*Leipothymia*, *æ*, f. λειποθυμια; from λειπω, to leave, and θυμος, the mind.) See Syncope.

LEISMAN (Giovanni Antonio), a German painter, who died in 1698, aged 94. Pozzo mentions two excellent pictures by him, one is a landscape with dreary mountains and thick woods, out of which appears a gang of robbers preparing to assault some unfortunate travellers; the other is a seaport enriched with views of elegant buildings and antiquities (*Watkins*).

LEISNIG, a town of Upper Saxony, in the circle of Leipsic, seated on the Mulde, where are manufactures of cloth, lace, stockings, &c. It is 24 miles E.S.E. of Leipsic and 32 N.W. of Dresden. Lon. 12. 53. E. Lat. 51. 7. N.

LE'ISURABLE. *a.* (from *leisure.*) Done at leisure; not hurried; enjoying leisure (*Brown*).

LE'ISURABLY. *ad.* (from *leisurable.*) At leisure; without tumult or hurry (*Hooker*).

LE'ISURE. *s.* (*loisir*, French.) 1. Freedom from business or hurry; vacancy of mind; power to spend time according to choice (*Temple*). 2. Convenience of time (*Shakspeare*). 3. Want of leisure: not used (*Shakspeare*).

LE'ISURELY. *a.* (from *leisure.*) Not hasty; deliberate; done without hurry (*Addison*).

LE'ISURELY. *ad.* (from *leisure.*) Not in a hurry; slowly; deliberately (*Addison*).

LEITH, a seaport in Edinburgshire, on the frith of Forth, two miles N. of Edinburgh, of which it is the port. It is large and populous, and being situate on both sides of the harbour, is divided into N. and S. Leith. The harbour is secured by a noble stone pier, at the mouth of a little river, called the Water of Leith; and is accommodated with an elegant draw bridge and a good quay. The commerce of Leith is very considerable; and the vessels employed in the London trade are, in general, of a large size; but the largest ships are those employed in the Greenland whale fishery. To Germany, Holland, and the Baltic, are exported lead, glass ware, linen, woollen stuffs, and a variety of other goods; as also to the other countries of Europe,

the West Indies, and America. Ships of great size are built at this port; and here are several extensive rope-walks. There are also flourishing manufactures of bottle-glass, window-glass, and crystal; a great carpet manufacture, a soap-work, and some iron forges. The number of inhabitants in Leith is estimated to be about 12,000. There are three churches, and an ancient hospital for disabled seamen. Lon. 3. 7. W. Lat. 56. 0. N.

LEITRIM, a county of Ireland, in the province of Connaught, bounded on the N. by Donegal Bay, on the N. E. by Fermanagh, on the E. by Cavan, on the S. E. by Longford, on the S. W. by Roscommon, and on the W. by Sligo. It is 42 miles long and 17 broad; is a fertile country, though mountainous, and produces great herds of black-cattle. It contains 21 parishes, and sent six members to parliament.

LEITRIM, the county-town of Leitrim, in Ireland; formerly a place of some note, of which St. Liegus was bishop. It is seated on the Shannon, five miles N. of Carrick, and 80 N.W. of Dublin. Lon. 8. 30. W. Lat. 53. 57. N.

LEIXLIP, a town of Ireland, in the county of Kildare, seated on the Liffey. It has a noble castle, with large gardens, on one side of which is a fine waterfall, called the Salmon leap. Near it are the ruins of the church and castle of Confy. Leixlip is eight miles W. of Dublin.

LELAND (John), antiquary-royal of England, was born in London, and educated at St. Paul's school, from whence he was sent to Christ's college, Cambridge, but afterwards he removed to All Soul's college, Oxford. On entering into orders he became chaplain to Henry VIII. who gave him the title of his antiquary. By virtue of the royal commission he searched various cathedrals and religious houses for curious records and secrets of antiquity, in which employment he spent six years, travelling over every part of the kingdom. Having completed his labours he was presented to the valuable living of Hasely in Oxfordshire, and to a prebend in the church of Salisbury. In 1545 he presented his collections to the king under the title of a Newe Yeare's Gifte. This, however, was only the beginning of what he proposed to execute, but while he was intent upon his studies a phrenzy seized him, in which state he continued to his death in 1552. His Itinerary and Collectanea have been published by Hearne.

Leland (John), well known by his writings in defence of Christianity, was born at Wigan in Lancashire in 1691, of eminently pious and virtuous parents. They took the earliest care to season his mind with proper instructions; but, in his sixth year, the small pox deprived him of his understanding and memory, and expunged all his former ideas. He continued in this deplorable state near a twelvemonth, when his faculties seemed to spring up anew; and though he did not retain the least traces of any impressions made on him before the distemper, yet he now discovered a quick apprehension and strong memory. In a few years after his parents settled in Dublin, which situation gave him an easy introduction to learning and the sciences. When he was properly qualified by years and study, he was called to be pastor to a congregation of Protestant dissenters in that city. He was an able and acceptable preacher, but his labours were not confined to the pulpit. The many attacks made on Christianity, and by some writers of no contemptible abilities, engaged him to consider the subject with the exactest care, and the most faithful examination. Upon the most deliberate inquiry, the truth and divine original, as well as the excellence and importance of Christianity, appearing to him with great lustre, he published answers to several authors who successively appeared in that cause. He was indeed a master in this controversy; and his history of it, styled "A View of the Deistical Writers that have appeared in England in the last and present century, &c." is very greatly and deservedly esteemed. In the decline of life he published another laborious work, entitled, "The Advantage and Necessity of the Christian Revelation, shown from the State of Religion in the ancient Heathen World, especially with respect to the Knowledge and Worship of the One true God; a Rule of moral Duty, and a State of future Rewards and Punishments; to which is prefixed, a long and preliminary Discourse on Natural and Revealed Religion," 2 vols. 4to. This noble and extensive subject, the several parts of which have been slightly and occasionally handled by other writers, Leland has treated at large with the greatest care, accuracy and candour. And, in his "View of the Deistical Writers," his cool and dispassionate manner of treating their arguments, and his solid confutation of them, have contributed more to depress the cause of atheism and infidelity, than the angry zeal of warm disputants. But not only his learning and abilities, but also his amiable temper, great modesty, and exemplary life, recommended his memory to general esteem and affection. He died in 1766.

Leland (Dr. Thomas), a native of Dublin, and member of the college in that city, who distinguished himself by a History of Ireland, a Life of Philip of Macedon, and a translation of Demosthenes. He died in 1785, aged 63.

LELAPS, a dog that never failed to seize and conquer whatever animal he was ordered to pursue. He was given to Procris by Diana, and Procris reconciled herself to her husband by presenting him with that valuable present. According to some, Procris had received him from Minos, as a reward for the

dangerous wounds of which she had cured him.

LELY (Sir Peter), a very eminent painter, was born at Soest in Westphalia in 1617, where his father, a captain of foot, was in garrison. His name was Vander Vaas; but being born at the Hague, at a perfumer's who kept the sign of the Lily, he received the appellation of captain Du Lys, or Lely, which became the proper name of his son. He received his first instructions in painting from one De Grebber. The great encouragement given by Charles I. to painting, drew him to England in 1641, where he at first painted landscapes with small figures, and also historical compositions; but finding face-painting more encouraged, he applied to it, and soon excelled all his cotemporaries; which procuring him great business, prevented his going to Italy, as he had intended: on which he procured the best drawings, prints, and paintings of the most celebrated Italians, and having at length the best collection of any one of his time, acquired an admirable style by his daily studying the works of those great masters. Thus in the correctness of his draughts, and in beauty of colouring, the graceful airs of his heads, the pleasing varieties of his postures, and in the gentle and loose management of his draperies, he excelled most of his predecessors, and will be a pattern to all succeeding artists. But the critics remark, that most of his faces have a languishing air, long eyes, and a drowsy sweetness peculiar to himself. He was a good history-painter, and his crayon draughts are also admirable. He was much favoured by king Charles II. who made him his principal painter, and conferred on him the honour of knighthood: he was also esteemed by persons of the greatest eminence in the kingdom. He died at London of an apoplexy, as he was drawing the duchess of Somerset, in the year 1680, and was buried in Covent-Garden church, where he has a marble monument.

LE'MAN. *s.* (*l'aimant*, the lover, French.) A sweetheart; a gallant (*Hanmer*).

LEMBRO, the ancient Imbros, an island of the Archipelago, on the coast of Romania, 22 miles in circumference, with a town of the same name and a harbour. Lon. 26. 0. E. lat. 40. 25. N.

LEMBURG, or LEOPOLD, a large commercial city of Poland, capital of the palatinate of Red Russia, and now of the Austrian kingdoms of Galicia and Lodomeria. It is well fortified, and defended by two citadels, one of which is on an eminence without the city. The square, churches, and public buildings, are magnificent. It has a Roman catholic archbishop, and an Armenian and Russian bishop. In 1672, it was besieged in vain by the Turks; but in 1704 was taken by storm, by Charles XII. of Sweden. It is seated on the Peltu, 90 miles N. W. of Kaminieck, and 150 E. of Cracow. Lon. 24. 26. E. lat. 49. 51. N.

LEMERY (Nicholas), a celebrated chemist, born at Rouen in Normandy in 1645. After having made the tour of France, he in 1672 commenced an acquaintance with M. Martyn, apothecary to Monsieur the Prince, and performed several courses of chemistry in the laboratory of this chemist at the Hotel de Condé, which brought him to the knowledge and esteem of the prince. He provided himself at length with a laboratory of his own, and might have been made a doctor of physic; but he chose to continue an apothecary, from his attachment to chemistry, in which he opened public lectures; and his confluence of scholars were so great as scarcely to allow him room to perform his operations. The true principles of chemistry in his time were but ill understood: Lemery was the first abolished the senseless jargon of barbarous terms, reduced the science to clear and simple ideas, and promised nothing that he did not perform. In 1681 he was disturbed on account of his religion, and came to England, where he was well received by Charles II: but affairs not promising him the same tranquility, he returned to France, and sought for shelter under a doctor's degree; but the revocation of the edict of Nantz drove him into the Romish communion to avoid persecution. He then became associate chemist and pensionary in the royal academy of sciences, and died in 1715. He wrote, A course of chemistry; An universal pharmacopoeia; An universal treatise of drugs; and, A treatise on antimony.

LEMISHOCHORTON. See CORALLINA CORSICANA.

LEMMA, Λημμα, of λαμβανω, I assume, in mathematics, denotes a previous proposition, laid down in order to clear the way for some following demonstration; and prefixed either to theorems, in order to render their demonstration less perplexed and intricate; or to problems, to make their resolution more easy and short. Thus, to prove a pyramid one third of a prism, or parallelopiped of the same base and height with it, the demonstration whereof in the ordinary way is difficult and troublesome, this lemma may be premised, which is proved in the rules of progression, that the sum of the series of the squares, in numbers in arithmetical progression, beginning from o, and going on 1, 4, 9, 16, 25, 36, &c. is always subtriple of the sum of as many terms, each equal to the greatest; or is always one-third of the greatest term multiplied by the number of terms. Thus, to find the inflection of a curve line, this lemma is first premised, that a tangent may be drawn to the given curve, in a given point.

So, in physics, to the demonstration of most propositions, such lemmata as these

are necessary first to be allowed: that there is no penetration of dimensions; that all matter is divisible; and the like. As also in the theory of medicine, that where the blood circulates, there is life, &c.

LE'MNA. Duck-weed. In botany, a genus of the class monœcia, order diandria. Calyx one-leafed; corolless; style one; capsule many seeded. Six species; of which four are common to the ponds of our own country; one to the South of Europe; and one to India.

LEMMING, in mastology. See Mus.

LEMN'ESCIA. In botany, a genus of the class polyandria, order monogynia. Calyx five-toothed; petals five; nectary cup-shaped, bearing the stamens capsule doubtful; five-celled with a single seed in each. One species: a tree of Guiana with scarlet flowers in a many flowered terminal corymb.

LEMNIAN Earth, in mineralogy. See Argilla.

LEMNISCATE, in the higher geometry, the name of a curve in the form of a figure of 8. As fig. 7. pl. 93. If AP be represented by x, PQ by y, and the constant line AB or AC by a, the equations $ay = x\sqrt{a^2-x^2}$, or $a^2y^2=a^2x^2-x^4$, expressing a line of the 4th order, will denote a lemniscate, having a double point in A. There may be other Lemniscates, as the Cassinoid or Cassinean *ellipse*; but the one above defined s the simplest.

This curve is manifestly quadrable. For, since $ay=x\sqrt{a^2-x^2}$; the fluxion of the curve or $y\dot{x}$ is $=\frac{x}{a}\dot{x}\sqrt{a^2-x^2}$: of which the fluent is $\frac{1}{3}a^2-\frac{1}{3a}(a^2-x^2)^{\frac{3}{2}}$, the general area of the curve. This, when $x=a$ becomes simply $\frac{1}{3}a^2=AQB$.

A right line may cut this curve in 2 points, as NQ; or in 4, as $m\,n\,p\,q$ even the right line BAC is conceived to cut the curve in 4 points, the double point A reckoning as 2. See Curve.

For solutions of the problem "to assign equal arcs in the lemniscate," see Leybourn's Mathematical Repository, N. S. vol. 1. pa. 204—209.

LEMNOS, a celebrated island of the Archipelago, now called Stalimene, situate near the strait of Gallipoli. It is above 112 miles in circumference according to Pliny, who says that it is often shadowed by Mount Athos, though at the distance of 87 miles. The poets made it sacred to Vulcan, who was hence called Lemnius Pater. Lemnos was also celebrated for its labyrinth, of which, not a trace remains; and what historians relate of it serves only to excite, but not to gratify, curiosity. The modern Greeks entertain the same opinion of that earth of Lemnos, which is said to have cured Philoctetes, and which Galen went to examine. It is never dug up but on one particular day of the year, and then with great ceremony. This earth, called Terra Sigillata, formed into small loaves, and sealed with the grand signior's seal, is then dispersed over all Europe. The greatest virtues are attributed to it; and yet a chemist can discover nothing but a mere clayey earth, incapable of producing the effects that have been attributed to it. Lemnos is subject to the Turks; but the inhabitants are almost all Greeks, and very industrious. Its capital is of the same name, and the see of a Greek archbishop. Lon. 25. 28. E. Lat. 40. 3. N.

LEMON, in botany. See Limon and Citrus.

Lemon Scurvy Grass. See Cochliaria Portensis.

Lemons, salt of, used to remove ink-stains from linen, is the native salt of sorrel, the super-oxalat of potash. The effect is produced by the oxalic acid dissolving with facility the oxyd of iron in the ink, on the combination of which with the tannin and gallic acid the colour depends; while, at the same time, it can be used without any risk of injury to the cloth, on which it has no effect. See Potash.

LEMONA'DE. *s.* (from *lemon.*) Liquor made of water, sugar, and the juice of lemons (*Arbuthnot*).

LEMUR. Maucauco. In zoology, a genus of the class mammalia, order primates. Fore-teeth, upper four, intermediate ones remote; lower, six, longer extended, compressed, parallel, approximate; grinders many, subolate, fore-most longer, sharper. Thirteen species, inhabiting Asia, Africa, or America. The following are the principal.

1. L. Ecaudatus. Tailless maucauco. Head and ears small; a sharp-pointed nose; and eyes surrounded with a white space, encircled with a black ring; a dark brown line, forked on the fore-head, extended along the back to the rump; body covered with a short, soft, and silky, ash-coloured and reddish fur; toes naked, with flat nails; those of the inner toe on each hind foot along, crooked, and sharp; length of the animal from the nose to the rump, is sixteen inches. It inhabits Ceylon and Bengal; lives in the woods, and feeds on fruits; is fond of eggs, and will greedily devour small birds. With the inactivity of a sloth, it creeps slowly along the ground; is very tenacious of its hold, and makes a plaintive noise.

2. L. Tardigradus. Loris. Tailless; body tawnish-ash. Back with a brown line; throat whitish; between the eyes a white longitudinal line; face hairy; ears urceolate, within bifoliate; hands, and feet, naked; nails rounded, those of the great toes subulate; teats two on the breast, two on

the upper part of the belly: size that of a squirrel. Inhabits Ceylon; agile, quick of hearing, monogamous.

3. L. Mongor. Mongor or woolly maucauco. Size of a cat, eyes lodged in a circle of black, and the space between them of the same colour; irids of an orange colour; short round ears; the end of the nose black; the rest of the nose, and the lower sides of its cheeks, white. When in full health, the whole upper part of the body covered with long soft and thick fur, a little curled or waved, of a deep brownish ash-colour; tail very long, and covered with the same sort of hair of the same colour; breast and belly white; hands and feet naked and dusky; nails, as in the two former species, flat; except that of the inner toe of the hind feet; it varies sometimes, with white or yellow paws, and a face wholly brown.

It inhabits Madagascar and the adjacent isles; turns its tail over its head to protect it from rain; feeds on fruits, and sleeps on trees; it is very good natured, and very sportive; but very tender; it is found as far as Celebes or Macassar.

Buffon gives the history of one that he had in his possession for several years. He says, that its tongue was rough like that of a cat; that when permitted, it would continue to lick a person's hand till it was inflamed, and often finished this operation with a severe bite. It amused itself with gnawing its own tail, and actually destroyed four or five vertebrae. Whenever it could escape, it went into the neighbouring shops in quest of fruits, sugar, and sweet-meats, opened the boxes that contained them, and helped himself. Dreaded cold and moisture; in cold weather never left the fire, and would stand on end to warm itself. Its movements were extremely brisk, and sometimes petulant; often slept during the day; but awoke with the slightest noise.

4. L. Maçao. Vari. Tailed; black; collar bearded. Three other varieties: β body brown; γ body white; δ black and white mixed. Very fierce in a wild state and makes so violent a noise in the woods, that it is easy to mistake the noise of two for that of an hundred; some have compared this noise to the roaring of a little lion. When taken young, and tamed, these animals are very gentle and good natured; their hind legs and thighs, like those of the two preceding species, are very long, which makes their pace sideling and bounding. It inhabits Madagascar.

5. L. Prehensilis. Little maucauco. Tail prehensile: size less than that of the black rat; a dark space round the eyes which are very large and full; the upper part of its body ash-coloured, the lower white; head round, nose sharp, and whiskers long; has two canine teeth in each jaw; four cutting teeth in the upper; six in the lower, and seven grinders on each side; ears large, roundish, naked, and membranaceous; toes long, but of unequal lengths; the nails round, and very short, tail as long as the body.

6. L. Volans. Flying maucauco. Near three feet long, and as broad; very distinct from yet resembling the bat and flying squirrel; inhabits the country about Guzarat, the Molucca isles, and the Philippines; feeds on the fruits of trees, and is called by the Indians, Caguang, Colugo, and Gigua; head long; mouth and teeth small; ears also small, round, and membranous; from the neck to the hands, and thence to the hind feet, extends a broad skin like that of a flying squirrel; the same is continued from the hind feet to the tip of the tail, which is included in it; the body and outside of the skin covered with soft hair, hoary or black, and ash-colour; the inner side of the extended skin appears membranous, with little veins and fibres dispersed through it; the legs clothed with a soft yellow down; has five claws on each foot; the claws slender, very sharp, and crooked; with these it strongly adheres to whatever it fastens on; tail slender, and about a span long. From our ignorance of the form of its teeth, its genus is very doubtful; but it is placed here on the authority of Linnéus.

LEMURES, the manes of the dead. The ancients supposed that the souls, after death, wandered over the world, and disturbed the peace of its inhabitants. The good spirits were called *lares familiares*; and the evil ones were known by the name of Larvæ, or Lemures. They terrified the good, and continually haunted the impious. The Romans celebrated festivals in their honor, called Lemuria or Lemuralia, in the month of May. They were first instituted by Romulus to appease the manes of his brother Remus, from whom they were called Remuria, and, by corruption Lemuria.

LEMURIA and LEMURALIA. See Lemures.

LENA, a large river of Siberia, which flows in a northerly direction, receives 16 other rivers, and falls into the Frozen Ocean, by several mouths.

LENÆA, a festival kept by the Greeks in honour of Bacchus, (called *Lenæus*, from ληνος, a *wine-press*) at which there was much feasting and Bacchanalian jollity, accompanied with poetical contentions, and the exhibition of tragedies. The poor goat was generally sacrificed on the occasion, and treated with various marks of cruelty and contempt, as being naturally fond of browsing on the vine-shoots.

To LEND. *v. a.* preterit and part. pass. *lent.* (lænan, Saxon.) 1. To afford or supply, on condition of repayment (*Dryden*). 2 To suffer to be used on condition that it be restored (*Shakspeare*). 3. To afford; to grant in general (*Addison*).

LENDER. *s.* (from *lend.*) 1. One who lends any thing. 2. One who makes a trade of putting money to interest (*Addison*).

LENFANT (James), a learned French writer born in 1661. After studying at Saumur, he went to Heidelberg, where he received imposition of hands for the ministry in 1684. He discharged the functions of this character with great reputation there, as chaplain of the electress dowager Palatine, and pastor in ordinary to the French church. The descent of the French into the Palatinate obliged our author to depart from Heidelberg in 1688. He went to Berlin, where the elector Frederic, afterwards king of Prussia, appointed him one of the ministers. There he continued 39 years, distinguishing himself by his writings. He was preacher to the queen of Prussia, Charlotta Sophia; and after her death, to the late king of Prussia. In 1707 he took a journey to England and Holland, where he had the honour to preach before Queen Anne; and might have settled in London, with the title of chaplain to her majesty. In 1712 he went to Helmstadt, in 1715 to Leipsic, and in 1725 to Breslaw, to search for rare books and MSS. It is not certain whether it was he that first formed the design of the Bibliotheque Germanique, which began in 1720; or whether it was suggested to him by one of the society of learned men, which took the name of Anonymous, and who ordinarily met at his house. He died in 1728. His principal works are, 1. The History of the Council of Constance, 2 vols. 4to. 2. A History of the Council of Pisa, 2 vols. 4to. 3. The New Testament translated from the Greek into the French, with notes by Beausobre and Lenfant, 2 vols. 4to. 4. The History of Pope Joan, from Spanheim's Latin dissertation. 5. Several pieces in the Bibliotheque Choisie, La Republique des Lettres, La Bibliotheque Germanique, &c.

LENGTH. *s.* (from lenᵹ, Saxon.) 1. The extent of any thing material from end to end; the longest line that can be drawn through a body (*Bacon*). 2. Horizontal extension (*Dryden*). 3. A certain portion of space or time (*Locke*). 4. Extent of duration or space (*Locke*). 5. Long duration or protraction (*Addison*). 6. Reach or expansion of any thing (*Watts*). 7. Full extent; uncontracted state (*Addison*). 8. Distance (*Clarendon*). 9. End; latter part of any assignable time (*Hooker*). 10. *At* Length. At last; in conclusion (*Dryden*).

To LE'NGTHEN. *v. a.* (from *length.*) 1. To draw out; to make longer; to elongate (*Arbuthnot*). 2. To protract; to continue (*Daniel*). 3. To protract pronunciation (*Dryden*). 4. *To* Lengthen *out.* To protract; to extend (*Dryden*).

To LE'NGTHEN. *v. n.* To grow longer; to increase in length (*Prior*).

LE'NGTHWISE. *ad.* (*length* and *wise.*) According to the length.

LE'NIENT. *a.* (*leniens*, Latin.) 1. Assuasive; softening; mitigating (*Pope*). 2. Laxative; emollient (*Arbuthnot*).

LE'NIENT. *s.* An emollient, or assuasive application (*Wiseman*).

To LE'NIFY. *v. a.* (*lenifier*, old French.) To assuage; to mitigate (*Dryden*).

LE'NITIVE. *a.* (*lenitif*, Fr. *lenio*, Lat.) Assuasive, emollient (*Arbuthnot*).

LE'NITIVE. *s.* 1. Any thing medicinally applied to ease pain. 2. A palliative (*South*).

LE'NITY. *s.* (*lenitas*, Lat.) Mildness; mercy; tenderness; softness of temper (*Daniel*).

LENOX, or Dumbartonshire, a county of Scotland. See Dumbartonshire.

LENS. a piece of glass, or any other transparent substance, the surfaces of which are so formed, that the rays of light, by passing through it, are made to change their direction, either tending to meet in a point beyond the lens, or made to become parallel after converging or diverging; or, lastly, proceeding as if they had issued from a point before they fell upon the lens. Some lenses are convex, or thicker in the middle; some concave, or thinner in the middle; some plano-convex, or plano-concave; that is, with one side flat, and the other convex or concave; and some are called *meniscuses*, or convex on one side and concave on the other. See Dioptrics.

LENSES, Blown, are used only in the single microscope, and the usual method of making them has been to draw out a fine thread of the soft white glass, called crystal, and to convert the extremity of this into a spherule, by melting it at the flame of a candle. But this glass contains lead, which is disposed to become opake by partial reduction, unless the management be very carefully attended to. We are informed, however, by Mr. Nicholson, that the hard glass used for windows seldom fails to afford excellent spherules. This glass is of a clear bright green colour when seen edgewise. A thin piece was cut from the edge of a pane of glass less than one-tenth of an inch broad. This was held perpendicularly by the upper end, and the flame of a candle was directed upon it by the blow-pipe, at the distance of about an inch from the lower end. The glass became soft, and the lower piece descended by its own weight to the distance of about two feet, where it remained suspended by a thin thread of glass about one five-hundredth of an inch in diameter. A part of this thread was applied endwise to the lower blue part of the flame of the candle, without the use of the blow-pipe. The extremity immediately became white hot, and formed a globule. The glass was then gradually and regularly thrust towards the flame, but never into it, until the globule was sufficiently large. A number of these were made; and being afterwards examined, by viewing their focal images with a deep magnifier, proved very bright, perfect, and round. This, as the ingenious author observes, may prove an acceptable piece of information to those eminent men

(and there are many such), whose narrow circumstances, or remote situations, are obliged to have recourse to their own skill and ingenuity for experimental implements.

Lenses, Ground, are such as are ground or rubbed into the desired shape, and then polished. Different shapes have been proposed for lenses; but several practical writers on optics have shewn that, after all, the spherical is the most practically useful. By many of the methods of grinding, however, the artificer, with his utmost care, can only produce an approximation to a truly spherical figure; and, indeed, gentlemen have, for the most part, nothing to depend on for the sphericity of the lenses of their telescopes, but the care and integrity of the workmen. In the forty-first volume of the Transactions of the Royal Society of London, a machine is described by Mr. Samuel Jenkins, which, as it is contrived to turn a sphere at one and the same time on two axes, cutting each other at right angles, will produce the segment of a true sphere merely by turning round the wheels, and that without any care or skill in the workmen. This machine is described at page 239, vol. ii. Dr. Gregory's Mechanics.

The following directions for grinding and polishing lenses, are given by Dr. Brewster, in the second volume of his edition of Ferguson's Select Lectures.

"Having fixed upon the proper aperture and focal distance of the lens, take a piece of sheet copper, and strike upon it a fine arch, with a radius equal to the focal distance of the lens, if it is to be equally convex on both sides, or with a radius equal to half that distance, if it is to be plano-convex, and let the length of this arch be a little greater than the given aperture. Remove with a file that part of the copper which is without the circular arch, and a convex gage will be formed. Strike another arch with the same radius, and having removed that part of the copper which is within it, a concave gage will be obtained. Prepare two circular plates of brass, about $\frac{1}{10}$ of an inch thick, and half an inch greater in diameter than the breadth of the lens, and solder them upon a cylinder of lead of the same diameter, and about an inch high. These tools are then to be fixed upon a turning lathe, and one of them turned into a portion of concave sphere, so as to suit the convex gage; and the other into a portion of a convex sphere, so as to answer the concave gage. When the surfaces of the brass plates are turned as accurately as possible, they must be ground upon one another alternately with flour emery till the two surfaces exactly coincide, and the grinding tools will then be ready for use.

"Procure a piece of glass, whose dispersive power is as small as possible, if the lens is not for achromatic instruments, and whose surfaces are parallel; and by means of a pair of large scissars or pincers, cut it into a circular shape, so that its diameter may be a little greater than the aperture of the lens. After the roughness is removed from its edges by a common grind-stone,* it is then to be fixed with black pitch to a wooden handle of a smaller diameter than the glass, and about an inch high, so that the centre of the handle may exactly coincide with the centre of the glass.

"When the glass is thus prepared for use, it is then to be ground with fine emery upon the concave tool, if it is to be convex, and upon the convex tool, if it is to be concave. To avoid circumlocution, we shall suppose that the lens is to be convex. The concave tool, therefore, which is to be used, must be firmly fixed to a table or bench, and the glass wrought upon it with circular strokes, so that its centre may never go beyond the edges of the tool. For every six circular strokes, the glass should receive two or three cross ones along the diameter of the tool, and in different directions. When the glass has received its proper shape, and touches the tool in every point of its surface, which may be easily known by inspection, the † emery is to be washed away, and finer kinds successively substituted in its room, till by the same alternation of circular and transverse strokes, all the scratches and asperities are removed from its surface. After the finest emery has been used, the roughness which remains may be taken away, and a slight polish superinduced by grinding the glass with pounded pumice-stone, in the same manner as before. While the operation of grinding is going on, the convex tool should, at the end of every five minutes, be wrought upon the concave one for a few seconds, in order to preserve the same curvature to the tools and the glass. When one side is finished off with pumice-stone, the lens must be separated from its handle by inserting the point of a knife between it and the pitch, and giving it a gentle stroke. The pitch which remains upon the glass may be removed by

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* When the focal distance of the lens is to be short, the surface of the piece of glass should be ground upon a common grindstone, so as to suit the gage as nearly as possible; and the plates of brass, before they are soldered on the lead, should be hammered as truly as they can into their proper form. By this means much labour will be saved, both in turning and grinding.

† Emery of different degrees of fineness may be made in the following manner: Take five or six clean vessels, and having filled one of them with water, put into it a considerable quantity of flour emery. Stir it well with a piece of wood, and after standing for five seconds, pour the water into the second vessel. After it has stood about twelve seconds, pour it out of this into a third vessel, and so on with the rest; and at the bottom of each vessel will be found emery of different degrees of fineness, the coarsest being in the first vessel, and the finest in the last.

rubbing it with a little oil, or spirits of wine; and after the finished side of the glass is fixed upon the handle, the other surface is to be ground and finished in the very same manner.

"When the glass is thus brought into its proper form, the next and the most difficult part of the operation is to give it a fine polish. The best, though not the simplest, way, of doing this, is to cover the concave tool with a layer of pitch, hardened by the addition of a little rosin, to the thickness of $\frac{1}{12}$ of an inch. Then having taken a piece of thin writing paper, press it upon the surface of the pitch with the convex tool, and pull the paper quickly from the pitch before it has adhered to it; and if the surface of the pitch is marked every where with the lines of the paper, it will be truly spherical, having coincided exactly with the surface of the convex tool. If any paper remains on the surface of the pitch, it may be removed by soap and water; and if the marks of the paper should not appear on every part of it, the operation must be repeated till the polisher, or bed of pitch, is accurately spherical. The glass is then to be wrought on the polisher by circular and cross strokes, with the oxyd of tin, called the flowers of putty in the shops, or with the red oxyd of iron, otherwise called colcothar of vitriol, till it has received on both sides a complete polish.* The polishing will advance slowly at first, but will proceed rapidly when the polisher becomes warm with the friction. When it is nearly finished, no more putty or water should be put upon the polisher, which should be kept warm by breathing upon it; and if the glass moves with difficulty from its adhesion to the tool, it should be quickly removed, lest it spoil the surface of the pitch. When any particles of dust or pitch insinuate themselves between the glass and the polisher, which may be easily known from the very unpleasant manner of working, they should be carefully removed, by washing both the polisher and the glass, otherwise the lens will be scratched, and the bed of pitch materially injured.

The operation of polishing may also be performed by covering the layer of pitch with a piece of cloth, and giving it a spherical form by pressing it with the convex tool when the pitch is warm. The glass is wrought as formerly, upon the surface of the cloth, with putty or colcothar of vitriol, till a sufficient polish is induced. By this mode the operation is slower, and the polish less perfect; though it is best fitted for those who have but little experience, and would therefore be apt to injure the figure of the lens by polishing it on a bed of pitch.

"In this manner the small lenses of simple and compound microscopes, the eye glasses, and the object glasses, of telescopes, are to be ground. In grinding concave lenses, Mr. Imison, employs leaden wheels with the same radius as the curvature of the lens, and with their circumferences of the same convexity as the lens is to be concave. These spherical zones are fixed upon a turning lathe, and the lens, which is held steadily in the hand, is ground upon them with emery, while they are revolving on the spindle of the lathe. In the same way convex lenses may be ground and polished, by fixing the concave tool upon the lathe; but these methods, however simple and expeditious they may be, should never be adopted for forming the lenses of optical instruments, where an accurate spherical figure is indispensable. It is by the hand alone that we can perform with accuracy those circular and transverse strokes, the proper union of which is essential to the production of a spherical surface." (*Brewster's Ferguson*).

LENS, (*Lens*, *tis*, f. a *lentore*, from its glutinous quality.) The lentil. *Ervum lens; pedunculis subbifloris; seminibus compressis, convexis* of Linnæus; φακος of the Greek writers. There are two varieties; the one with large, the other small seeds. They are eaten in many places as we eat peas, than which they are more flatulent, and more difficult to digest. A decoction of these seeds is used as a lotion to the ulcerations after small-pox, and it is said with success. See ERVUM, also CRYSTALLINE LENS.

LENT, a solemn time of fasting in the Christian church, observed as a time of humiliation before Easter, the great festival of our Saviour's resurrection. Those of the Romish church, and some of the Protestant communion, maintain, that it was always a fast of 40 days, and, as such, of apostolical institution. Others think it was only of ecclesiastical institution, and that it was variously observed in different churches, and grew by degrees from a fast of 40 hours to a fast of 40 days. This is the sentiment of Morton, Bishop Taylor, Du Moulin, Daillé, and others.

The Christians of the Greek church observe four lents: the first commences on the 15th of November; the second is the same with our Lent; the third begins the week after Whitsuntide, and continues till the festival of St. Peter and St. Paul; and the fourth commences on the first of August, and lasts no longer than till the 15th. These lents are observed with great srtictness and austerity; but on Saturdays and Sundays they indulge themselves in drink-

* As colcothar of vitriol is obtained by the decomposition of sulphat of iron or martial vitriol, it sometimes retains a portion of this salt. When this portion of martial vitriol is decomposed by dissolution in water, the yellow ochre which results penetrates the glass, forms an incrustation upon its surface, and gives it a dull and yellowish tinge, which is communicated to the image which it forms.

ing wine and using oil, which are prohibited on other days.

LENT. The part. pass. of *lend*.

LE'NTEN. *a.* (from *lent.*) Such as is used in lent; sparing (*Shakspeare*).

LENTI'CULAR. *a.* (*lenticulaire*, French.) Double convex; of the form of a lens (*Ray*).

LE'NTIFORM. *a.* (*lens* and *forma*, Lat.) Having the form of a lens.

LENTI'GINOUS. *a.* (from *lentigo*, Latin.) Scurfy; scurfuraceous.

LENTI'GO. *s.* (Latin.) A freckly or scurfy eruption upon the skin (*Quincy*).

LENTIL, in botany. See CICER.

LENTISE, or LENTISK, in botany. See PISTACIA.

LENTISE PERUVIAN. See SCHINUS.

LENTANDO. (Ital.) In music, a word implying that the notes over which it is written are to be played from the first to the last with increasing slowness.

LENTEMENT. (French.) A word signifying that the movement to which it is prefixed is to be performed in a slow time.

LENTO. (Ital.) In music, a term implying a slow time.

LE'NTITUDE. *s.* (from *lentus*, Latin.) Sluggishness; slowness.

LE'NTNER. *s* A kind of hawk (*Walton*).

LE'NITOR. *s.* (Lat.) 1. Tenacity; viscosity (*Bacon*). 2. Slowness; delay (*Arbuthnot*). 3. (In physic.) That sizy, viscid, coagulated part of the blood, which, in malignant fevers, obstructs the capillary vessels (*Quincy*).

LE'NTOUS. *a.* (*lentus*, Lat.) Viscous; tenacious; capable to be drawn out (*Brown*).

LEO, in zoology. See FELIS.

LEO I. pope, surnamed the Great, was an Italian by birth, and had been employed by Popes Celestin I. and Sextus III. in several important affairs. He succeeded the latter pontiff in 440, and distinguished himself by his zeal against the manichees and other heretics, and in endeavouring to extend the papal see. His works amount to three vols. folio. He died in 461 (*Watkins*).

LEO II. was born in Sicily, and succeeded Agatho in the popedom, A. D. 682. He pretended an authority over the eastern church, and instituted holy water. He died in 683.

LEO III. succeeded Adrian I. in 795. The nephews of the preceding pope formed a conspiracy against Leo, and having seized upon him in a procession, dragged him into a monastery, where they sadly mangled him. He afterwards recovered, and sought an asylum in France. Charlemagne sent him back to Italy with a strong guard, and he entered Rome in triumph. He afterwards crowned that monarch emperor of the West; but on his death a new conspiracy was formed against Leo, which being discovered, he put his enemies to death. He died in 861 (*Watkins*).

LEO IV. a Roman, ascended the papal chair after Sergius II. in 847, and died in 855. The Saracens having invaded the ecclesiastical state in his time, he marched against them, and obtained a complete victory; after which he put the city of Rome into a state of defence, by building a wall all round it, and erecting strong fortifications.

LEO V. the successor of Benedict IV. in 703. He was driven from his seat a few months after his election, and died in prison.

LEO VI. a Roman, succeeded John, in 928, and died the year following. He is considered as an intruder by many of the Catholic historians.

LEO VII. a Roman, was elected pope on the death of John XI. in 936. He was a man of great zeal and piety, and died in 939.

LEO VIII. was elected pope on the deposition of John XII. in 963, by the authority of the Emperor Otho, hence Baronius and others treat him as an intruder. However his character stands high as a man of great probity, and many of the Catholics regard him with respect as a legitimate pontiff, and an honour to the chair. He died in 965.

LEO IX. who bears the distinction of a saint in the calendar, was born of an illustrious family, and became bishop of Toul, and in 1048 was chosen pope. He convened several councils for the reformation of the manners of the ecclesiastics, and to condemn the errors of Berenger on the eucharist. The Normans having marched into Italy, in 1053, he marched against them at the head of a Germany army; but was beaten and taken prisoner. The conquerors conducted him to Rome, where he died the year following (*Watkins*).

LEO X. whose proper name was John de Medicis, is a pope, ever to be remembered by Protestants, as having proved the cause of the reformation begun by Martin Luther. He had been honoured with a cardinal's hat at 14 years of age, and some years after with the dignity of legate, by Julius II. He was in that quality in the army which was defeated by the French, near Ravenna, in 1512, where he was taken prisoner. The soldiers, who had overcome him, showed him such great veneration, that they humbly asked his pardon for gaining the victory, besought him to give them absolution for it, and promised never to bear arms against the pope. When Pope Julius died, Leo was very ill of the venereal disease at Florence, and was carried to Rome in a litter. His hurrying about every night to the cardinals of his faction, occasioned the breaking of his ulcer; and the matter which ran from it exhaled such a stench, that all the cells in the conclave, which were separated only by thin partitions, were scented by it. Upon this the cardinals consulted the physicians of the conclave, to know what the matter was. They, being bribed,

said the Cardinal de Medicis could not live a month; which sentence occasioned his being chosen pope. Thus Cardinal de Medicis, then not 30 years of age, was elected pope upon a false information; and as joy is the most sovereign of all remedies, he soon after recovered his health, so that the old cardinals had reason to repent their credulity. He was better calculated for a temporal prince, being ambitious, politic, luxurious, a connoisseur in the fine arts, and an accomplished fine gentleman: thus qualified, it is no wonder that so young a pontiff, neglecting the true interest of his church, should avail himself of the folly of religious dupes, and publicly sell indulgences to support his prodigality, especially as he was known to disbelieve Christianity itself, which he called "A very profitable fable for him and his predecessors." In 1517, he published general indulgences throughout Europe (and ordered the priests to recommend them), in favour of those who would contribute any sum towards completing the church of St. Peter; and this was the basis of the réformation. See LUTHER and INDULGENCE. Leo died in 1521.

It is but justice to add, that to this pope (whatever was his private conduct) was principally owing the revival of polite literature in Italy. He spared neither pains nor expense in recovering ancient manuscripts, and procuring good editions of them; he favoured the arts and sciences; and gloried in being the patron of learned and ingenious men, who in return have been very lavish in his praise. Mr. Pope, in his Essay on Criticism, bestows on him these harmonious lines:

But see! each muse in Leo's golden days
Starts from her trance, and trims her wither'd bays;
Rome's ancient genius, o'er its ruins spread,
Shakes off the dust, and rears his rev'rend head.
Then sculpture and her sister arts revive:
Stones leap to form, and rocks begin to live;
With sweeter notes each rising temple rung;
A Raphael painted, and a Vida sung.

Mr. Roscoe has lately published, "The Life and Pontificate of Leo."

LEO (St.), a small but strong town of Italy, in the territory of the church and duchy of Urbino, with a bishop's see. It is seated on a mountain, near the river Marrechia, in Lon. 12, 25. E. Lat. 43. 57. N.

LEO, *the Lion*, a considerable constellation of the northern hemisphere, being one of the 48 old constellations, and the fifth sign of the zodiac. It is marked thus ♌, as a rude sketch of the animal.

The Greeks fabled that this was the Nemæan lion, which had dropped from the moon, but being slain by Hercules, was raised to the heavens by Jupiter, in commemoration of the dreadful conflict, and in honour of that hero. But the hieroglyphical meaning of this sign, so depicted by the Egyptians long before the invention of the fables of Hercules, was probably no more than to signify, by the fury of the lion, the violent heats occasioned by the sun when he entered that part of the ecliptic.

The stars in the constellation Leo, in Ptolemy's catalogue, are 27, besides 8 unformed ones, now counted in later times in the constellation Coma Berenices, in Tycho's 30, in that of Hevelius 49, and in Flamsteed's 95; one of them, of the first magnitude, in the breast of the Lion, is called Regulus, and Cor Leonis, or Lion's Heart.

LEO MINOR, *the Little Lion*, a constellation of the northern hemisphere, and one of the new ones that were formed out of what were left by the ancients, under the name of Stellæ Informes, or unformed stars; and added to the 48 old ones. It contains 53 stars in Flamsteed's catalogue.

LE'OD. *s.* The people; or, rather, a nation, country, &c. (*Gibson*).

LE'OF. *s.* *Leof* denotes love; so *leofwin* is a winner of love (*Gibson*).

LEOMINSTER, a town of Herefordshire, in England, seated on the river Lug, which waters the north and east sides of the town, and over which there are several bridges. It is a large, handsome, populous borough; and is a great thoroughfare betwixt South-Wales and London, from which last it is distant 113 measured miles. In king John's reign it was burnt, but soon rebuilt. It was incorporated by queen Mary, and is governed by a high steward, bailiff, recorder, 12 capital burgesses (out of whom the bailiff is chosen), and a town-clerk. Its market is on Friday, and its fairs, which are all noted for horses and black-cattle, on February 13th, Tuesday after Midlent Sunday, May 13th, July 10th, September 4th, and November 1st. The market was on Thursday till it was changed, on a petition from the cities of Hereford and Worcester complaining of their loss of trade; since which, the vast trade it had in wool and wheat is much lessened. The best flax is said to grow here, and it has been equally noted for the best wheat, barley, and the finest bread, The inhabitants drive a considerable trade not only in wool, but in gloves, leather, hat-making, &c. and there are several rivers in and about the town, on which they have mills and other machines. Near its church are some remains of its priory; and on a neighbouring hill are the ruins of a palace, called to this day Comfort-castle. It has several good inns, and sends two members to parliament. Lon. 2. 45. W. Lat. 52. 20. N.

LEON, a province of Spain, with the title of a kingdom; bounded on the north by Asturias; on the west by Galicia and Portugal; and on the south by Estremadura and Castile, which also bounds it on the east. It is about 125 miles in length, and

100 in breadth; and is divided into two almost equal parts by the river Duero, or Douro. It produces all the necessaries of life, and Leon is the capital town.

Leon, an ancient and large episcopal town of Spain, and capital of the kingdom of that name, built by the Romans in the time of Galba. It has the finest cathedral church in all Spain. It was formerly more rich and populous than at present, and had the honour of being the capital of the first Christian kingdom in Spain. It is seated between two sources of the river Esra, in Lon. 5. 13. W. Lat. 42. 55. N.

LEONARDA da Vinci. See Vinci.

LEONATAS, one of Alexander's generals, distinguished himself in Alexander's conquest of Asia, and once saved the king's life in a dangerous battle. After the death of Alexander, at the general division of the provinces, he received for his portion that part of Phrygia which borders on the Hellespont. Like the rest of the generals of Alexander, he was ambitious of power and dominion, and aspired to the sovereignty of Macedonia. He passed from Asia into Europe to assist Antipater against the Athenians, and was killed in a battle which was fought soon after his arrival. (*Curt. Plut.* &c.)

LEONIDAS, a celebrated king of Lacedæmon, of the family of the Eurysthenidæ, opposed Xerxes, king of Persia, who had invaded Greece with about five millions of souls. He was offered the kingdom of Greece by the enemy, if he would not oppose his views; but Leonidas heard the proposal with indignation, and observed, that he preferred death for his country, to an unjust, though extensive dominion over it. The battle was fought at Thermopylæ, and the 300 Spartans, who alone had refused to abandon the action, withstood the enemy during three successive days, till Ephialtes, a Trachinian, perfidiously conducted a detachment of Persians by a secret path up the mountains, which suddenly fell upon the rear of the Spartans, and crushed them to pieces. Only one ingloriously escaped of the 300; he returned home, where he was treated with insult and reproaches. This celebrated battle taught the Greeks to despise the numbers of the Persians, and to rely upon their own intrepidity. Temples were raised to the fallen hero, and festivals, called Leonidea, yearly celebrated at Sparta, in which free-born youths contended. (Herodot. Justin, &c.)—There were other Greeks of this name, but of inferior note, one of whom was also king of Lacedæmon, 257 years B. C.

LEONINE, in poetry, is applied to a kind of verses which rhyme at every hemistich, the middle always chiming to the end.

In this kind of verse we find several ancient hymns, epigrams, prophecies, &c. For instance; Muretus, speaking of the poetry of Lorenzo Gambara of Bresse, says,

Brixia vestrates, quæ condunt carmina vates
Non sunt nostrates tergere digna nates.

The following one is from the school of Salernum:

Ut vites pœnam, *de potibus incipe* cœnam.

The origin of the word is somewhat obscure: Pasquier derives it from one Leoninus, or Leonius, who excelled in this way, and dedicated several pieces to pope Alexander III. others derive it from pope Leo; and others, from the beast called lion, because it is the loftiest of all verses.

M. Fauchet makes the leonine rhyme the same with what the French call the rich, and we the double rhyme, i. e. where two syllables have the same orthography, accentuation, and pronunciation, with two others.

Leonine, is sometimes used adjectively, to denote lion-like.

LEONIS Cor, Lion's heart, a fixed star, of the first magnitude, in the sign Leo; called also Regulus, Basilicus, &c.

LEONTICE. Lion's-leaf. In botany, a genus of the class hexandria, order monogynia. Calyx six-leaved, deciduous; corol six-petalled; nectary six-leaved, spreading, placed on the claws of the petals. Five species: two indigenous to the levant and Archipelago: one to the Alps; one to Siberia and one to Virginia.

LEONTINI, or LEONTIUM (anc. geog.), a town of Sicily on the south side of the river Terias, 20 miles north-west of Syracuse. The territory, called Campi Leontini, was extremely fertile (Cicero): these were the Campi Læstrigonii, anciently so called; the seat of the Læstrigons, according to the commentators on the poets. The name Leontini is from Leo, the impression on their coin being a lion. Now called Lentini, a town situated in the Val di Noto, in the south-east of Sicily.

LEONTIUM, a celebrated courtezan of Athens, who studied philosophy under Epicurus, and became one of his warmest pupils. She prostituted herself to the philosopher's scholars, and as some have asserted, even to Epicurus himself. (*Vid.* Epicurus.) Leontium not only professed herself a warm admirer and follower of the doctrines of Epicurus, but she even wrote a book in support of them against Theophrastus. This book was valuable, if we believe the testimony and criticism of Cicero.

LE'ONTODON. Dandelion. In botany, a genus of the class syngenesia, order polygamia œqualis. Receptacle naked; calyx double; down simple pedicelled. Five species, natives of Europe; of which the two following are common to our own country.

1. L. Taraxacum. Outer calyx reflected; scape one-flowered; leaves runcinate, gla-

brous, with lanceolate toothed lobes. It is found in our pastures, on the banks of ditches, and road-sides. The leaves when young and tender make a good sallad, and the French eat both these and the root. It has been long supposed to be a powerful diuretic, whence the vulgar name assigned to it of Piss-a-bed. In many of our dispensatories it still retains a place under the name of Taraxacum: which see.

2. L. palustris. Outer calyx erect, oppressed, with ovate scales; scape one-flowered; leaves sinnate, toothed, nearly glabrous. Found in our marshes or wet moors.

LEONURUS. Mother-wort. Lion's-tail. In botany, a genus of the class didynamia, order gymnospermia. Calyx five-sided, five-toothed; upper lip of the corol concave, villous, entire; lower lip three-parted, with the middle segment undivided; anthers sprinkled with shining dots. Six species, chiefly natives of Siberia, one of our own country, one common to Java.

1. L. Cardiaca, with spear-shaped, three lobed leaves, on the foot-stalks being the Cardiaca of other botanists, or common Mother-wort. 2. L. Marrubiastrum, with oval, spear-shaped, serrated leaves, and sessile, prickly cups, or the Marrubiastrum, or hore-hound shaped. 3. L. Crispus, with leaves divided into three parts, which are cut in their edges, and with hairy cups. 4. L. Supinus, with leaves divided into three parts, which terminate with narrow blunt segments. 5. L. Tartarias, three-parted, segments slightly cut. Calyxes unarmed. 6. L. Siberius, three parted, upper lip of the corol concave, straight.

The first species is a perennial plant, and grows not only in many parts of England, but in other countries of Europe. It is never cultivated in gardens, except for the sake of variety. The other species are biennial plants, which grow naturally in different parts of Europe, and are raised from seeds sown in the spring, upon a bed of common earth.

LEOPARD, in mastology. See Felis.

Leopard's-bane, in botany. See Doronicum.

Leopard's-bane, mountain. See Arnica.

LEOPOLD I. emperor of Germany, was the second son of Ferdinand III. and of Mary Anne of Spain. He was born in 1640, became king of Hungary in 1655, king of Bohemia in 1656, and emperor in 1658. He had two great powers to contend with, France on the one side, and the Turks on the other; and suffered in his war with both. France took from him Alsace, and many other frontier places of the empire; and the Turks would have taken Vienna, had they not been compelled to raise the siege by John Sobieski king of Poland. Prince Eugene of Savoy, a young and enterprising general in the imperial service, gave also a turn to the affairs of Leopold, whose tyranny, however, was so great, that his Hungarian subjects were nearly on the point of revolting when he died in 1705. (*Watkins*).

Leopold II. the son of the emperor Francis I., and of Maria Theresa of Austria, was born at Vienna in 1747, and succeeded his father in the duchy of Tuscany in 1765, which he governed with great wisdom; but the toleration which he granted to the protestants occasioned great discontents among the people, fomented by the bishops and priests. In 1790 he succeeded the emperor Joseph II., and no sooner was he gone to Vienna, than the malcontents openly shewed themselves in opposition to the measures he had adopted. But, by a summary punishment of the ringleaders, this insurrection was soon quelled. In 1791 Leopold concluded a peace with the Turks. The revolution in France gave him considerable uneasiness; but he was very irresolute in his conduct; and before he had come to any determination on the subject of war, carried off by a fever, March 1, 1792. He was succeeded by his son Francis (*Watkins*).

LEOSTHENES, an Athenian general, who, after Alexander's death, drove Antipater to Thessaly, where he besieged him in the town of Lamia. The success which for a while attended his arms, was soon changed by a fatal blow which he received from a stone thrown by the besieged, B. C. 323. The orator Hyperides pronounced the funeral oration over his body at Athens. (*Diod. Strab.*)——Another Athenian general, condemned for bad success which attended his arms.

LEOTYCHIDES, a king of Sparta, son of Menares, of the family of the Proclidæ. He was set over the Grecian fleet, and, by his courage and valor, he put an end to the Persian war at the famous battle of Mycale, The battle of Platæa, in which the Greeks obtained a signal victory, was fought on the same day that the Persian fleet was destroyed at Mycale. Leotychides was accused of a capital crime by the Ephori, and, to avoid the punishment which his guilt seemed to deserve, he fled to the temple of Minerva at Tegea, where he perished, B. C. 469, after a reign of 22 years. He was succeeded by his grandson Archidamus. (*Paus. Diod.*)——A son of Agis, king of Sparta, by Timæa. The legitimacy of his birth was disputed, and Agesilaus was appointed in his place. *C. Nep.* &c.

LEPANTO, a strong and very considerable town of Turkey in Europe, and in Livadia, with an archbishop's see and a strong fort. It is built on the top of a mountain, in form of a sugar-loaf; and is divided into four towns, each surrounded by walls, and commanded by a castle on the top of a mountain. The harbour is very small, and may be shut up by a chain, the entrance being but 50 feet wide. It was taken from the Turks by the Venetians in

1687; but was afterwards evacuated, and the castle demolished in 1699, in consequence of the treaty of Carlowitz. It was near this town that Don John of Austria obtained the famous victory over the Turkish fleet in 1571. The produce of the adjacent country is wine, oil, corn, and rice. Turkey leather is also manufactured here. The wine would be exceedingly good if they did not pitch their vessels on the inside; but this renders the taste very disagreeable to those who are not accustomed to it. The Turks have six or seven mosques here, and the Greeks two churches. It is seated on a gulph of the same name, in E. lon. 22. 13. N. lat. 38. 34.

LEPAS. Acorn-shell. In zoology, a genus of the class vermes, order testacea. Animal a triton; shell affixed at the base, and consisting of many unequal erect valves. Thirty-one species, of which eleven are common to the rocks and shells of our own coast: the rest are chiefly Indian and Mediterranean frequenters, we shall instance a specimen or two.

1. L. Tintinnabulum. Shell conic, obtuse, bell-shaped, rugged and fixed. There is a variety of a white colour. Inhabits European, Indian and American seas; found occasionally on the British coasts; frequently adhering to the bottoms of ships and pieces of wreck. Shell purple, varied with white and red, or bluish; sometimes cylindrical or a little thicker; the elevated valves are perpendicularly striate, the depressed ones transversely; pesies of the lid nearly equal.

2. L. Cornubiensis. Shell with a dilated base, and rather narrow aperture; valves grooved near the lower edges. Inhabits the coasts of Cornwall; resembles a limpet.

3. L. Anatifera. Duck-bernacle. Shell compressed, five-valved, smooth, seated on a peduncle.

ϐ. Another variety, shell rounded.

γ. The longer valve spinous on the back.

δ. Cancellate; with fine striæ; cinereous. Inhabits most seas, and is generally found fixed in clusters to the bottoms of vessels, and old pieces of floating timber; generally whitish, with a blue cast; the margins of the valves yellow; sometimes marked with a ray or two dotted with black; peduncle long, coriaceous, black and very much wrinkled towards the shell, and growing paler and pellucid towards the base, extensile; sometimes, though rarely, red; valves finely striate; the two larger ones triangular; the two top ones nearly triangular, and about half the size; the other narrow, long, curved, rounded at the back, a little protuberant at the base, and inclosing the rest. This species was formerly supposed to be the origin of the Bernacle duck or goose.

LEPER. *s.* (*lepra*, *leprosus*, Latin.) One infected with a leprosy (*Hakewill*).

LE'PEROUS. *a.* (formed from *leprous.*) Causing leprosy (*Shakspeare*).

LEPIDAGATHIS. In botany, a genus of the class didynamia, order angiospermia. Calyx many-leaved, imbricate; corol two-lipped, the upper lip very small, lower lip three-parted; capsule two-celled, two-valved. One species; an East Indian plant with diffused, branched, woody stems.

LEPIDIUM. Pepper-wort. In botany, a genus of the class tetradynamia, order siliculosa. Silicle emarginate, elliptic, the valves carinate, but not margined, contrary to the partition. Twenty-eight species; chiefly European plants; a few natives of Asia and America: three common to our own wastes and moist shades. Of these last the more frequent is L. Latifolium, with ovate-lanceolate leaves, undivided and serrate. The whole plant has a hot acid taste like pepper, and is often used with other esculents instead of this spice, when it was formerly known by the name of *Poor-man's Pepper*.

LEPIDOLITE, in mineralogy. See MICA.

LEPIDOPTERA. In zoology, the third order of the Linnéan class insecta, thus ordinally characterised, wings four, covered with fine imbricate scales; tongue involute, spiral; body hairy. See ZOOLOGY.

LEPISMA. In zoology, a genus of the class insecta, order aptera. Lip membranaceous, rounded, emarginate: feelers four; two setuceous, two capitate; antennas setuceous; body imbricate with scales; tail ending in setuceous bristles; legs six, formed for running. Seven species; habitations, Europe, Asia, or America; two common to England.

The residence of the lepisma is usually in gardens and damp houses. In the former, they retreat under mouldy boards or flagstones; and in the latter, they are seen about window sashes, and old boxes that have remained for some time in a humid situation. When their haunts are disturbed, they make off with so great velocity, that they are but seldom caught; and when that happens, they are often destroyed, being, from their softness, easily crushed. The lawn and pupa are six-footed, active, and swift.

1. L. Saccharina. Colour a shade of lead, brightening into silver: its most conspicuous member is the tail, which consists of three long threads, slender and fine; which, if viewed with a microscope, are covered with tufts of hair. Antennas pisma long and filiform; in some, nearly equal to the length of the body: feet six in number, presenting a short and truncated appearance at their insertion: they are received into a groove in the body of the animal, where each has its origin, covered with an oval scale. Towards the tail there are six other appendices, much shorter, which may be termed false feet, as they seem to give

timid animal, always lean; and runs swifter up a hill than on even ground: whence when started, it endeavours to run up hill. Often escapes the hounds by various artful doublings; frequently keeps all day in its seat, and feeds by night; returns to its form by the same road that it left it: does pair. The rutting season is February or March, when the male pursues the female by the sagacity of its nose. They breed often in the year; go with young only thirty or thirty-one days; and bring three or four at a time. admit the male during the time of their gestation, and have frequently superfetations. The male and female are liable to be mistaken the one for the other. The mother suckles her young about twenty days. The fur is of great use in the manufacture of hats. They are very subject to fleas, yet the Dalecarlians make a cloth of the fur, which, it is said, preserves the wearer from the attack of these insects.

Hares feed on vegetables, and are very fond of the bark of young trees, except that of the alder and lime, which, it is said, they never touch. They are great lovers of birch, parsley and pinks. Their flesh was a forbidden food among the ancient Britons: the Romans, on the contrary, held it in great esteem.

Inter quadrupedes gloria prima lepus,

was the opinion of Martial; and Horace, who was likewise a bon vivant, says, that every man of taste must prefer the wing:

Fecundi leporis sapiens sectabitur armos.

At present the flesh of the female is preferred to that of the male; and that of those bred on dry hilly ground, to that of those which reside in marshy or wet places.

The hare and the rabbit afford to man the double advantage arising from their number and utility. Hares sleep much, but always with their eyes open. They have neither eye-lids nor eye-lashes. Their eyes seem to be bad; but they have an acute sense of hearing, and enormous ears in proportion to the size of their bodies. These long ears they move with great facility, and employ them as a rudder to direct their course, which is so rapid, that they outstrip all other animals. The period of their natural life is about seven years: the males live longer than the females. They pass their days in solitude and silence, frequently in fear and trembling; as a falling leaf is sufficient to alarm them. Their voice is never heard, but when they are seized or wounded. It is then a sharp loud cry, and has some resemblance to the human voice. They are easily tamed; but never acquire that degree of attachment which is necessary to make them domestic; and usually take the first opportunity of regaining their liberty. They have been trained to beat a drum, to perform gestures in cadence, &c. They want not instinct sufficient for their own preservation, nor sagacity for escaping their enemies. The sportsman has frequent opportunities of observation, and can recount many instances of their surprising sagacity, though they have not all equal experience and cunning. See hunting and hare hunting. They turn more or less white with age. And are thought to be larger and stronger, in proportion to the coldness of the climate. A perpetual enmity is carried on against them, not only by men and dogs, but also by cats, foxes, wolves, and birds of prey, such as owls, buzzards, vultures, and eagles; so that it is almost a miracle that any of them escape destruction. Those with horns may be regarded as monsters in this species; the horns resemble those of the Roebuck. Such instances have occurred in Saxony; and Pallas adds another found near Astracan.

In Cook's voyages mention is made of straw-coloured animals like dogs, which run like hares, and have since been admitted as a variety into this species.

2. L. variabilis. *Varying Hare.* The varying hare has a soft down upon it, which is grey in summer, with a slight mixture of black and tawny. Ears shorter, and legs more slender than those of the common hare: tail entirely white, even in summer: feet closely and warmly covered with fur. In winter, the whole animal changes to a snowy whiteness, except the tips and edges of the ears, which remain black; as do also the soles of the feet, on which, in Siberia, the fur is doubly thick. It is less than the common species. It inhabits the highest Scottish Alps, Norway, Lapland, Russia, Siberia, Kamschatka, the banks of the Wolga, and Hudson's Bay. In Scotland, it keeps on the tops of the highest hills, and never descends into the vales, nor mixes with the common hares. Does not run fast, but takes shelter in the clefts of rocks: is easily tamed; full of frolic, and fond of honey, and caraway comfits: It eats its own dung before a storm: It changes its colour in September, and resumes its grey coat in April. In the extreme cold of Greenland only, it is always white. Both this, and the preceding species are common in Siberia, and on the banks of the Wolga. The one never changes colour; the other, a native of the same place, constantly assumes the whiteness of the snow during the winter. This it does, not only in the open air and in a state of liberty; but, as has been proved by experiment, even when kept tame, and preserved in apartments kept warm with stoves, in which it experiences the same changes of colour, as if it had remained on the snowy plains.

They assemble, and are seen in troops of five or six hundred, migrating in spring, and returning in autumn. Compelled by the want of subsistence, they quit in winter the lofty hills, and seek the plains and wooded parts, where vegetables abound. Towards spring, they return to their mountain quarters.

Mr. Muller says he once saw two black hares of a wonderful fine gloss, and black as jet. Another of the same kind was taken near Casan in winter 1768. These of course form a second variety and the specimens are much larger than the common kind. In the southern and western parts of Russia, there is a mixed breed of hares, between this and the common species, forming a third variety. This sustains, during winter only, a partial loss of colour. The sides, and more exposed parts of the ears and legs, in that season, become white: the other parts retain their colours. This variety is unknown beyond the Urallian Chain. They are called by the Russians russacks. They are taken in great numbers in snares, and their skins exported to England, and other places, for the manufacture of hats. The Russians and Tartars, like the Britons of old, hold the flesh of hares in detestation, esteeming it impure: that of the variable hare, in its white state, is excessively insipid.

3. L. Americanus. *American Hare.* Ears tipt with grey; upper part of the tail black,

lower white: neck and body mixed with ash, rust colour, and black. Legs of a pale ferruginous colour; belly white. Fore-legs shorter, and hind ones longer in proportion than those of the common hare. Measures eighteen inches in length, and weighs from three to four pounds and a half. Inhabits all parts of North America. In New Jersey, and the colonies to the south of that province, these animals retain their colour during the whole year. But to the northward, on the approach of winter, they change their short summer fur, for one very long, silky and silvery, even to the roots, the edges of the ears only preserving their deeper hue. At that time, it is in the highest season for the table, and is of vast use to those who winter in Hudson's Bay, where they are taken in great abundance in springs made of brass wire, placed in hedges, constructed on purpose, with holes before the snares for the hares or rabbits to pass through.

They breed once or twice a-year, and have from five to seven at a time. Do not migrate, like the preceding, but always haunt the same places. Do not burrow, but lodge under fallen timber, and in hollow trees. Breed in the grass; but, in the spring, shelter their young in hollow trees, to which they also run when pursued. The hunters force them out of those retreats, by means of a hooked stick, or by making a fire, and driving them out by the smoke.

4. L. Caniculus. *Rabbit.* Of which there are five varieties from difference of colour; brownish-grey; white with red eyes; black; black and white; silvery grey, feet brown. The ears of the rabbit are almost naked. The colour of its fur, in a wild state, is brown: its tail black above, and white beneath. Inhabits the temperate and the warm parts of Europe, and even the hottest parts of Asia and Africa. Is not originally British, but succeeds here admirably well. Will not live in Sweden, and the northern countries, except kept in houses. Strabo tells us, that they were imported into Italy from Spain. They are not natives of the western hemisphere, but have been carried thither, and increase greatly in South America. Are exceedingly prolific: breed seven times in a year, and produce eight young at a time. If we suppose this to happen regularly, one pair may produce in four years the amazing number of 1,274,840. Are more prolific than the common hare: which two species, though similar, never intermix. Rabbits pair, and are said to be faithful to their mates. They live to the age of eight or nine years. The offspring is said to pay great deference to their first father. Upon a call, which they are accustomed to obey, he always put himself at their head, and arrives first. He then stands at the mouth of their hole till they had all gone in. In warrens, they keep in their burrows during the middle of the day, and come out in the morning and evening to feed. The males are apt to destroy the young; but their burrows protect them from those enemies that destroy such vast numbers of young hares. Their skins are a great article of commerce; vast numbers of them are exported to China: their fur, like that of the other hares, is of great use in hat manufactories. 5. L. Angorensis Angora rabbit. Like the goat and cat of the same place, remarkable for its hair, which is long, waved, and of a silky fineness: a beautiful and valuable animal.

6. L. Saccatus. Hooded rabbit. A doub skin over its back, into which it can withdraw its head; and another under its throat, into which it can withdraw its fore-feet. Has small holes in the loose skin on its back, to admit light to its eyes when its head is covered. Body ash-coloured: head and ears brown. Habitation unknown. See RABBIT.

7. L. Tolai. *Baikal Hare.* Tail short but longer than that of the rabbit; in the male, the ears are longer in proportion than those of the varying hare: fur of the same colour with that of the common hare. Red about the neck and feet. Tail black above, and white beneath. Size between that of the common, and that of the varying hare. The name here given it marks its country. It extends from the lake Baikal as far as Thibet. The Tanguts call it Rangwo, and consecrate it to the spots of the moon. It agrees with the common rabbit in the colour of its flesh; but does not burrow. When pursued, runs for shelter straight to the holes of the rocks, without any circuitous doublings, like those of the common hare; so that it agrees in nature, neither with the hare nor the rabbit. The Mongols call it Tolai. Its fur is bad, and is of no use in commerce.

8. L. Capensis. *Cape Hare.* Ears dilated in the middle. On the outside naked, and of a rose colour: inside and edges covered with short grey hairs. Crown and back dusky, mixed with tawny; cheeks and sides ash-coloured: breast, belly, and legs, rust-coloured. Tail, which it carries upwards, of a pale ferruginous colour, and bushy. Of the size of a rabbit, and inhabits the country for three days march north of the Cape of Good Hope. It is there called the mountain hare: for it lives only in the rocky mountains, and does not burrow. It is difficult to shoot it, as, on the sight of man, it instantly runs into the fissures of the rocks. The same species probably extends as high as Senegal. 9. L. Viscaccia. Peruvian hare. Hair very soft, and of a mouse-colour; tail pretty long, bristly and turned up; ears and whiskers like those of the common rabbit. In the time of the Incas, their hair was spun, and wove into cloth, which was so fine, as to be used only by the nobility. Inhabit the colder parts of Peru.

10. L. Brasiliensis. *Brazilian hare.* Tailless, has very large ears, and a white ring round its neck. Face of a reddish colour; chin white; eyes black; colour like that of the common hare, only a little darker; belly whitish. Some want the ring round the neck. They live in the woods; are very prolific; and are reckoned very good meat. Do not burrow. Are found both in Brazil and in Mexico, where they are called Citli.

11. L. Alpinus. *Alpine hare.* Short brown rounded ears, a long head, and very long whiskers, with two very long hairs above each eye. Fur ferruginous, tipt with white, and intermixed with several long dusky hairs; but, at the first look, the whole animal seems of a bright bay. Is only about nine inches long. This species are first seen on the Altaic Chain, and extend to lake Baikal in Tartary, and thence to Kamschatka and the Fox Isles. They inhabit always the middle region of the snowy mountains, in the roughest places, wooded, and abounding with herbs and moisture. Sometimes burrow; but are more frequently found in crevices between the rocks, in pairs, or more, according to conveniency. In cloudy weather they assemble

and lie on the rocks, and emit a sound, so like that of a sparrow, as to deceive the hearer. On the report of a gun, they run into their holes; but soon come out again, supposing it to be a clap of thunder, to which they are so much used in their lofty habitations. By wonderful instinct, they make a provision against the rigorous season in their inclement seats. Towards autumn, a company of them collect vast heaps of choice herbs and grasses, nicely dried, which they place either beneath the overhanging rocks, or in the chasms, or round the trunk of some tree. The way to these heaps is marked by a worn path. The heaps are formed like conoid ricks of hay, and are of various sizes, according to the number of the society employed in forming them. They are sometimes of a man's height, and many feet in diameter, but usually about three feet.

Thus, they wisely provide their winters stock, otherwise they must perish, being prevented by the depth of the snow from quitting their retreats in quest of food.

They select the best of vegetables; and crop them when in the fullest vigour. These they make into the best and greenish hay, by the judicious manner in which they dry them. These ricks too are the origin of fertility amidst the rocks; for their remains, mixed with the dung of the animals, rotting, in the otherwise barren chasms, create a soil productive of vegetables.

These ricks are also of great service to those who devote themselves to the laborious employment of sable hunting. Being obliged to go far from home, their horses would often perish for want, if not supported by the casual provisions of these industrious little animals. The people of Jakutz are said to feed both their horses and cattle with the reliques of the winter stock of these hares. Such supply may be serviceable to some in the spring, when their own stock is exhausted; but, should they depend solely on these feeble mountaineers, they would deserve to lose both horses and cattle every hard winter.

These hares are neglected as food by man; but they are the prey of sables, and of the Siberian weasel, which are joint inhabitants of the same mountains. They are likewise greatly infested by the oestrusleporinus a species of gadfly, which, in August and September, lodges its eggs in their skin, and often proves fatal to these feeble and defenceless, though industrious creatures.

12. L. Ogotona. *Ogoton hare.* Oblong oval ears, a little rounded; shorter whiskers than the former species; fur long and smooth; light grey in the middle; white at the ends, intermixed with a few dusky hairs; with a yellowish spot on the nose; and a space about the rump of the same colour. Limbs also yellowish on the outsides, and belly white. It is only about six inches long. The male weighs from six ounces and a half, to seven and a quarter; the female, from four to four and three quarters. Inhabits the same countries as the Alpine hare, and lives in the open vallies, and on gravelly or rocky naked mountains, under heaps of stones; but in a sandy soil burrows leaving two or three entrances. Their holes run obliquely: and in these they make their nests of short grass. They wander chiefly in the night. Voice excessively shrill, in a note like that of a sparrow, twice or thrice repeated, but very easily to be distinguished from that of the Alpine hare. Fond of the bark of a sort of service tree, and of the dwarf elm. Before the approach of severe cold, they collect great quantities of herbs, and fill their holes with them. Directed by the same instinct as the former species, they rear in autumn, their ricks of hay, of a hemispherical form, about a foot high and wide. In the spring, these elegant heaps disappear. They copulate in the spring. About the latter end of June, the young are observed to be full grown. They are the prey of hawks, magpies and owls; but the cat manul makes the greatest havock among them. The ermine and fitchet are equally their enemies.

13. L. Pusillus. *Calling hare.* Named by the Tartars Ittsitskan, or the barking mouse; has a longer head in proportion to its size, which is very diminutive, than is usual with hares. Head thickly covered with fur, even to the tip of the nose. Has large whiskers: ears large and rounded: legs very short; soles furred beneath. Its whole coat very long, soft and smooth; with a thick long fine down beneath, of a brownish lead colour. The hair of the same colour, of a light grey towards the ends, and tipt with black. The lower parts of the body hoary: the sides and ends of the fur yellowish. Length about six inches: weight from three ounces and a quarter, to four and a half. In winter scarcely two and a half. This tribe inhabit the south-east parts of Russia; but are found no where, in the east, beyond the river Oby. They delight in sunny vallies, and hills covered with herbs, especially those near the edges of woods, to which they run on any alarm. They live so concealed a life, as very rarely to be seen; but are often taken in winter in the snares laid for the ermines. They choose, for their burrows, a dry spot, amidst bushes, covered with a firm sod, preferring the western sides of the hills. Their place would scarcely be known, but for their excrements; and even these they drop, by a wise instinct, under some bush, lest their dwelling should be discovered by their enemies among the animal creation.

It is their voice alone that betrays their abode. Their cry is like the piping of a quail, but deeper; and so loud, as to be heard at the distance of half a Germam mile. It is repeated, by just intervals, three, four, and often six times. This cry is emitted at night, and in the morning; but seldom in the day, except in rainy or cloudy weather. It is common to both sexes; but the female is silent for some time after parturition, which happens about the beginning of May. She brings forth six at a time, blind and naked: suckles them often, and covers them carefully with the materials of her nest.

These most harmless and inoffensive creatures never go far from their holes. They feed, and make their little excursions by night; drink often; sleep little, and are easily made tame. They will scarcely bite when handled; yet the males have been observed, when in confinement, to attack each other, and to express their anger by a grunting noise.

LEPUS, the hare, in astronomy, a constellation of the southern hemisphere; whose stars in Ptolemy's catalogue are 12; in that of Tycho 13; in the Britannic catalogue 19; viz. 0. 0. 3. 6. 4. 6.

LE'RCHEA. In botany, a genus of the class monadelphia, order pentandria. Calyx five-toothed; corol funnel-form, five-cleft; anthers five, seated on the tube of the germ; style one: capsule three celled, many seeded. One species, an irregular shrub of the East-Indies.

LERE. *s.* (læpe, Saxon.) A lesson, lore; doctrine; obsolete (*Spenser*).

LERIA, or LEIRIA, a strong town of Estremadura in Portugal, with a castle and bishop's see. It contains about 3500 inhabitants, and was formerly the residence of the kings of Portugal. Lon. 7. 50. W. Lat. 39. 40. N.

LERIDA, an ancient, strong, and large town of Spain, in Catalonia, with a bishop's see, an university, and a strong castle. This place declared for king Charles after the reduction of Barcelona in 1705: but it was retaken by the duke of Orleans in 1707, after the battle of Almanza. It is seated on a hill near the river Segra, and in a fertile soil, in Lon. 0. 35. E. Lat. 41. 31. N.

LERINA, or PLANASIA, (anc. geog.), one of the two small islands over against Antipolis, called also Lerinas and Lirinus. Now St. Honorat, on the coast of Provence, scarce two leagues to the south of Antibes.

LERINS, the name of two islands in the Mediterranean sea, lying on the coast of Provence in France, five miles from Antibes; that near the coast, called St. Margaret, is guarded by invalids, state prisoners being sent thither. It was taken by the English in 1746, but Marshal Belleisle retook it in 1747. The other is called St. Honorat; and is less than the former, but has a Benedictine abbey.

LERMA, a town of Spain, in Old Castile, seated on the river Arlanza, with the title of a duchy. Lon. 3. 5. W. Lat. 42. 2. N.

LERNA, a county of Argolis, celebrated for a grove and a lake, where, according to the poets, the Danaides threw the heads of their murdered husbands. It was there also that Hercules killed the famous hydra. *Virg. Strab.* &c.—There was a festival, called Larnæ, celebrated there in honour of Bacchus, Proserpine, and Ceres.

LERN'ŒA. In zoology, a genus of the class vermes, order mollusca. Body oblong, somewhat cylindrical, naked; tentacles or arms two or three on each side and round, by which it affixes itself; ovaries two, projecting like tails from the lower extremity. These are eyeless, and very troublesome to fishes, adhering very firmly to them, and principally to their gills and fins. Fifteen species chiefly found adhering to fishes in the north seas, about three or four to those on our own coast. The following are those mostly worthy noticing.

1. L. Branchialis. Body round, flexuous; mouth lateral and seated between three slightly branched horns. Inhabits the North Seas on the gills of cod-fishes, and is eaten by the Greenlanders: about two inches long.

2. L. Cyprinacea. Body cylindrical, clavate behind: thorax forked; tentacles lunate at the tip; about half an inch long, and of the size of a straw, round, pale and somewhat pellucid: tentacles four, two of them lunate at the tip. Inhabits the ponds of our own country; fixt to the sides of carp, rouch and crucian.

3. L. Salmonea. Salmon-louse. Body obovate; thorax, inversely heart-shaped; arms two, approximate linear. Inhabits the gills of salmon: six lines long.

LERNICA, formerly a large city in the island of Cyprus, as appears from its ruins; but is now no more than a large village, seated on the southern coast of that island, where there is a good road, and a small fort for its defence.

LERO (anc. geog.), one of the two small islands in the Mediterranean, opposite to Antipolis, and half a mile dsstant from it to the South. Now St. Margarita over against Antibes on the coast of Provence.

Lero, or *Leros*, an island of the Archipelago, and one of the Sporades; remarkable, according to some authors, for the birth of Patroclus. Lon. 26. 15. E. Lat. 37. 0. N.

LE ROY *le veut*, a form of words, by which the royal assent is signified by the clerk of the parliament to public bills; to private bills this assent is expressed by *soit fait comme il est desiré.*

Le Roy *s'avisera.* By these words to a bill, presented to the king by his parliament, is understood his absolute denial of that bill in a more civil way; and the bill thereby becomes wholly null and void. See Parliament.

LERRY. *s.* (from *lere.*) A rating; a lecture.

LERWICK, the chief town of the Shetland Islands, situate on the east side of Mainland, the principal island. It is the rendezvous of the fishing busses from Britain, Holland, Denmark, and other parts. Lon. 1. 30. W. Lat. 60. 20, N.

LESBONAX, a philosopher of Mitylene, who flourished in the first century. There are two orations under his name in Alduss's edition of ancient orators, and a treatise De figuris Grammaticis, printed at Leyden in 1739.

LESBOS, a large island in the Ægean sea, on the coast of Æolia, of about 168 miles in circumference. It has been severally called *Pelasgia*, from the Pelasgi by whom it was first peopled; Macaria, from Macareus who settled in it; and Lesbos, from the son-in-law and successor of Macareus who bore the same name. The chief towns of Lesbos were Methymna and Mitylene. It was originally governed by kings, but they were afterwards subjected to the neighbouring powers. The wine which it produced was greatly esteemed by the ancients, and

still is in the same repute among the moderns. The Lesbians were so debauched and dissipated, that the epithet of Lesbian was often used to signify debauchery and extravagance.

LESCAILLE (Catherine), a native of Holland, and called by some the Dutch Sappho. She died in 1711. Her works chiefly consist of tragedies, very irregular, but discovering in many respects strong marks of superior genius.

LESCAR, a town of France, in the department of the Lower Pyrenees. It was lately a bishop's see; and is seated on a hill, three miles N.W. of Pau, and 42 SE. of Bayonne. Lon. 0. 7. W. Lat. 43. 17. N.

LESGUIS, one of the seven Caucasian nations, between the black Sea and the Caspian. Their country is indifferently called by the Georgians, Lesguistan, or Daghestan. It is bounded on the south and east by Persia and the Caspian; on the SW. and W. by Georgia, the Ossi, and Kisti; and on the N. by the Kisti and Tartar tribes. It is divided into a variety of districts, generally independent, and governed by chiefs elected by the people. The Lesguis are supposed to be descended from the tribes of mountaineers, known to ancient geographers under the name of Lesgæ or Ligyes. The strength of their country, which is a region of mountains whose passes are known only to themselves, has probably, at all times, secured them from foreign invasion. They subsist by raising cattle, and by predatory expeditions into the countries of their more wealthy neighbours. During the troubles in Persia, towards the beginning of this century, they repeatedly sacked the towns of Shamachie and Ardebil, and ravaged the neighbouring districts. In their persons and dress, and general habits of life, as far as these are known to us, they greatly resemble the Circassians.

LESINA, a town of Naples, in Capitanata, with a bishop's see, 26 miles N.N.W. of Manfredonia, and 86 N.N.E. of Naples. Lon. 15. 14. E. Lat. 41. 44. N.

LESION. See Læsion.

LESKEARD, a borough in Cornwall, with a market on Saturday. It had formerly a castle, now in ruins, and is one of the coinage of the towns for tin. It sends two members to parliament, is governed by a mayor, and has a considerable manufacture of yarn. It is 31 miles E.N.E. of Truro, and 221 W. by S. of London. Lon. 4. 36. W. Lat. 50. 27. N.

LESLIE (John), bishop of Clogher, was born in Scotland of a good family, and educated at Aberdeen and at Oxford. His first preferment was the bishopric of the Orkneys, from whence he was removed to Raphoe in Ireland, in 1633. He built there a stately palace in the form of a castle, in which he endured a long siege against Oliver Cromwell. On being obliged to surrender he retired to Dublin, where he held several ordinations. In 1661 he was translated to Clogher. He died in 1671, aged above 100 years, and having been above half a century a bishop.

Leslie (Charles), son of the preceding, was born in Ireland, and educated at Dublin, where he took his degree of M. A., and and on entering into orders, became chancellor of the diocese of Connor. He rendered himself very obnoxious to the popish party, by disputing successfully with some of their priests, and converting thereby several persons, particularly a gentleman of some consequence among them. He signalized himself also in many other respects against the arrogance of the papists, who took great liberties in consequence of James II. being of their religion. But though Mr. Leslie opposed strenuously the popish principles, he could not bring himself to alienate his allegiance from that monarch, and thereby lost all his preferments at the revolution. He then commenced political writer, and published several smart works in defence of hereditary right, and non-resistance. He also wrote some admirable pieces against the quakers, dissenters, socinians, and deists. Becoming obnoxious on account of his politics, he was obliged to withdraw secretly to France, where he joined the pretender, and had liberty to officiate in a private chapel, according to the rites of the church of England. He accompanied that prince to Italy, and endeavoured to convert him to protestantism; but being disappointed, and also indifferently treated, he returned to his own country, and died at his house at Glaslough, in the county of Monaghan, in 1722. His theological works have been collected into 2 vols. folio. They shew great depth of judgment, and most extensive reading.

The most celebrated of Mr. Leslie's works is his "Short and Easy Method with the Deists, wherein the certainty of the Christian Religion is demonstrated by Infallible Proof, from four Rules, which are incompatible to any imposture that ever yet has been, or can possibly be." This valuable little tract was written at the suggestion of the Duke of Leeds, who said "if christianity were a truth, there must be some short way of shewing it to be so; and he wished Mr. Leslie would think of it." Such a hint to such a man was effectual; and produced this little book in three days. Mr. Leslie argues that the truth of a matter of fact may be certainly known, if it be attended with certain marks, such as no "false fact" can certainly have. These marks are four. It is required, first, that the fact be a sensible fact, such as men's outward senses can judge of; secondly, that it be notorious, performed publicly in the presence of witnesses; thirdly, that there be memorials of it, or monuments, and actions kept up in memory of it; fourthly, that such monuments and actions begin with the fact. It is

the design of Mr. Leslie to shew how these four marks all meet in the facts of Revelation. Dr. Conyers Middleton, feeling how necessary it was to his principles, that he should some way rid himself of the weight of Leslie's argument, looked out for some "false fact" to which the four criteria might be applied: and this he did for 20 years together, without being able to find one. This we state upon the authority of Dr. Berkeley son to the celebrated Bishop of Cloyne. We do not learn, however, that Dr. Middleton abandoned his deistical notions, notwithstanding he was thus compelled to acknowledge that the argument was triumphantly in favour of Christianity. What is there in credulity, bigotry, superstition, or enthusiasm, half so ridiculous and lamentable, as the pertinaceous adherence to dangerous error here exhibited? After this short account of Mr. Leslie's book, it is almost needless to add that we warmly recommend it to every candid enquirer after truth.

LESS. A negative or private termination. (leaſ, Sax. *loos*, Dut.) joined to a substantive it implies the absence or privation of the thing expressed by that substantive: as, a witless man, a man without wit.

LESS. *a.* (leaſ, Saxon.) The comparative of little: opposed to greater (*Locke*).

Less. *s.* Not so much; opposed to more, or to as much (*Exodus*).

Less. *ad.* In a smaller degree; in a lower degree (*Dryden*).

LESSE'E. *s.* The person to whom a lease is given.

To LE'SSEN. *v. a.* (from less.) 1. To make less; to diminish in bulk. 2. To diminish the degree of any state or quality; to make less intense (*Denham*). 3. To degrade; to deprive of power or dignity (*Atterbury*).

To Le'ssen. *v. n.* To grow less; to shrink; to be diminished (*Temple*).

LE'SSER. *a.* A corruption of less (*Pope*).

LE'SSER. *ad.* (formed by corruption from less.) (*Shakspeare*).

LE'SSES. *s.* (*laissées*, French.) The dung of beasts left on the ground.

Lesser-Tone, in music. See Tone.

LESSING (Gotthold Ephraim), a German poet, was the son of a minister at Kametz, and educated at Meissen, from whence he was sent to Leipsic, where he applied himself to dramatic poetry, and finished a comedy called the Young Scholar, but led rather an irregular life, which gave his father great uneasiness. On leaving Leipsic, he went to Berlin, where he formed an acquaintance with Voltaire. Here he wrote and translated several books, and formed many plans which he did not live to execute. He was for some time secretary to general Tauenzien, at Breslaw, where he gave way to play so that his literary labours were suspended.

LE'SSON. *s.* (*leçon*, French.) 1. Any thing read or repeated to a teacher, in order to improvement (*Denham*). 2. Precept; notion inculcated (*Spenser*). 3. Tune pricked for an instrument (*Davies*). 4. A rating lecture (*Sidney*).

To LE'SSON. *v. a.* (from the noun.) To teach; to instruct (*Shakspeare*).

Lesson, among ecclesiastical writers, portions of the Holy Scriptures, read in Christian churches, at the time of divine service.

In the ancient church, reading the Scriptures was one part of the service of the Catechumens, at which all persons were allowed to be present, in order to obtain instruction.

The church of England, in the choice of lessons, proceeds as follows: for the first lesson on ordinary days, she directs, to begin at the beginning of the year with Genesis, and so continue on, till the books of the Old Testament are read over, only omitting the Chronicles, which are for the most part the same with the books of Samuel and Kings, and the other particular chapters in other books, either because they contain names of persons, places, or other matters less profitable to ordinary readers.

The course of the first lessons for Sundays is regulated after a different manner. From Advent to Septuagesima Sunday, some particular chapters of Isaiah are appointed to be read, because that book contains the clearest prophecies concerning Christ. Upon Septuagesima Sunday Genesis is begun, because that book, which treats of the fall of man, and the severe judgment of God inflicted on the world for sin, best suits with a time of repentance and mortification. After Genesis, follow chapters out of the books of the Old Testament, as they lie in order; only on festival Sundays, such as Easter, Whitsunday, &c. the particular history relating to that day is appointed to be read; and on the Saints' days, the church appoints lessons out of the moral books, such as Proverbs, Ecclesiastes, Ecclesiasticus, &c. as containing excellent instructions for the conduct of life.

As to the second lessons, the church observes the same course both on Sundays and week days: reading the gospels and Acts of the Apostles in the morning, and the epistles in the evening, in the order that they stand in the New Testament: excepting on saints-days and holy days, when such lessons are appointed, as either explain the mystery, relate the history, or apply the example to us.

Lesson, was formerly used by most musical composers to signify those exercises for the harpsicord or piano-forte which are now more generally called sonatas. The length, variety, and style, of lessons, are not regulated by any acknowledged rule, but entirely depend on the fancy and abilities of the composer, and the class of practitioners for whose use the pieces are designed. The word lesson is also applied to that instruc-

tion which a master communicates to his pupil at each visit or sitting

LE'SSOR. *s.* One who lets any thing to farm, or otherwise, by lease (*Denh. Ayliffe*).

LEST. *conj.* (from the adjective *least.*) That not; I hide it lest it may be lost; that is, I hide it that it may not be lost (*Addis*).

LESTOFF. See LOWESTOFT.

L'ESTRANGE (Sir Roger), a noted writer in the 17th century, was descended from an ancient family, seated at Haunstanton-hall in the county of Norfolk, where he was born in 1616, being the youngest son of sir Hammond L'Estrange baronet, a zealous royalist. Having in 1644 obtained a commission from king Charles I. for reducing Lynn in Norfolk, then in possession of the parliament, his design was discovered, and his person seized. He was tried by a court martial at Guildhall in London, and condemned to die as a spy; but was reprieved, and continued in Newgate for some time. He afterward went beyond sea; and in August 1653 returned to England, where he applied himself to the protector Oliver Cromwell; and having once played before him on the bass-viol, he was by some nicknamed Oliver's fiddler. Being a man of parts, master of an easy humorous style, but withal in narrow circumstances, he set up a newspaper, under the title of The Public Intelligencer, in 1663; but which he laid down, upon the publication of the first London gazette in 1665, having been allowed, however, a consideration by government. Some time after the Popish plot, when the Tories began to gain the ascendant over the Whigs, he, in a paper called the Observator, became a zealous champion for the former. He was afterwards knighted, and served in the parliament called by king James II. in 1685. But things taking a different turn in that prince's reign, in point of liberty of conscience, from what most people expected, our author's observations were disused, as not at all suiting the times. However, he continued licenser of the press till king William's accession, in whose reign he met with some trouble as a disaffected person. However, he went to his grave in peace, after he had in a manner survived his intellectuals. He published a great many political tracts, and translated several works from the Greek, Latin, and Spanish; viz. Josephus's works, Cicero's Offices, Seneca's Morals, Erasmus's, Colloquies, Æsop's Fables, and Bonas's Guide to Eternity. The character of his style has been variously represented; his language being observed by some to be easy and humorous, while Mr. Gordon says, "that his productions are not fit to be read by any who have taste or good-breeding. They are full of phrases picked up in the streets, and nothing can be more low or nauseous."

LESTRE, a town of France, in the department of the channel, and chief place of a canton, in the district of Valognes: one league and three quarters E. Valognes: and four and a half N. Carentan.

LESTWITHIEL, a town of England, in the county of Cornwall, situated on the river Fowey, which was formerly navigable, so far for vessels of considerable burden, but the river is now choked up, and the trade of the town, which was once flourishing is now in a state of decay. Near it are the ruins of a castle, formerly the residence of the earls of Cornwall. It is, however, a corporation, and sends two members to the British parliament; thirty-one miles E.N.E. Truro, and 230 W.S.W. London. Lon. 4. 48. W. Lat. 50. 27. N.

To LET. *v. a.* (lætan, Saxon.) 1. To allow; to suffer; to permit *Dryden*). 2. A sign of the optative mood used before the first, and imperative before the third person. Before the first person singular it signifies relation, fixed purpose, or ardent wish (*Judges*). 3. Before the first person plural, let implies exhortation: let us die bravely (*Mark*). 4. Before the third person, singular or plural, *let* implies permission: let him go free (*Dryden*). 5. Before a thing in the passive voice, let implies command: let the door be opened (*Dryden*). 6. Let has an infinitive mood after it without the particle to (*Dry.*) 7. To leave (*L'Estrange*). 8. To more than permit (*Shakspeare*). 9. To put to hire; to grant to a tenant (*Swift*). 10. To suffer any thing to take a course which requires no impulsive violence (*Joshua*). 11. To permit to take any state or course (*Sid.*) 12. To let blood, is elliptical for to let out blood. To free it from confinement; to suffer it to stream out of the vein (*Shaks.*) 13. To let in to admit (*Knolles*). 14. To let in, or into. To procure admission (*Locke*). 15. To let off; to discharge (*Swift*). 16. To let out; to lease out; to give to hire or farm.

To LET. *v. a.* (lettan, Saxon.) 1. To hinder; to obstruct; to oppose (*Dryden*). 2. *To* let, when it signifies to permit or leave, has let in the preterit and part. passive; but when it signifies to hinder, it has letted; as, many things have letted me.

To LET. *v. n.* To forbear; to withhold himself (*Bacon*).

LET. *s.* (from the verb.) Hinderance: obstacle; obstruction; impediment (*Hooker*).

LET, the termination of diminutive words, from lyte, Saxon, little, small: as rivulet, a small stream; hamlet, a little village.

LETCHLADE. See LECHLADE.

LETHA'RGIC. *a.* (*lethargique*, French.) Sleepy by disease, beyond the natural power of sleep (*Hammond*).

LETHA'RGICNESS. *s.* Morbid sleepiness; drowsiness to a disease (*Herbert*).

LE'THARGIED. *a.* (from *lethargy.*) Laid asleep; entranced (*Shakspeare*).

LETHARGY. *Lethargus.* A heavy and constant sleep, with scarce any intervals of waking; when awakened, the person answers, but ignorant or forgetful of what he

said, immediately sinks into the same state of sleep. It is symptomatic of fever, apoplexy, &c.

LETHE, in Mythology, one of the rivers of hell, whose waters the souls of the dead drank after they had been confined for a certain space of time in Tartarus. The draught caused them to forget whatever they had done, seen, or heard before, as the name implies, λήθη, oblivion.—Lethe is a river, of Africa near the Syrtes, which runs under the ground, and some time after rises again, whence the origin of the fable of the Lethean streams of oblivion.—There are also two other rivers of this name, one in Spain, the other in Bœotia.

LE'THRUS. In entomology a Fabrician tribe of the coleopterous genus Lucanus, which see.

LETRIM. See Leitrin.

LETTER, litera, a character either in print or writing, by which any people have agreed to express one of the sounds, used in conveying their thoughts to each other in speech.

Letter is by some defined, a simple uncompounded sound of the voice, that cannot be subdivided into any more simple, and generally marked with a particular character.

But it must be owned that, strictly speaking, a letter is not the sound itself, but rather the sign of a sound; for γραμμα litera, is derived from γεγραμμαι, of γραφω, to write: and litera is formed from *litus*, the participle of linere, to smear, or mark; whence obliterare signifies to blot out.

Where a sign or character does not express a sound entirely simple, but one resolvable into several, it is not so properly a letter as an abbreviation, containing in itself as many letters as its power does simple sounds. This is evident in the Latin &, *x*, and the Greek ξ, ψ, ς, &c. which are composed of *e*, *t*, *k*, *s*, κσ, πσ, στ, &c.

On the contrary, a simple sound, though expressed by several characters, is yet to be esteemed one letter; for *th*, *ph*, are single letters, as much as φ, θ, and *f*.

The letters *f*, *g*, *h*, *k*, *q*, *x*, *y*, *z*, were unknown to the ancient Romans, as is proved by Dausquius in his Orthography, where he traces the origin of the several letters. See F, G, H, &c.

Grammarians distinguish letters into vowels and consonants; into mutes, dipthongs, liquids, and characteristics.

The Hebrews divide their letters into guttural, as *a*, *h*, *ch*, *gn*, aleph, he, chaph, hain, expressed by אהחע; dental, as *z*, *s*, *ts*, *r*, *sh*, zain, samech, tsade, resh, schin, expressed by זסצרש; labial, as *b*, *m*, *u*, p, beth, mem, vau, phe, expressed by the word בומף; *lingual*, or those chiefly formed by the tongue, as *d*, *t*, *l*, *n*, *th*, daleth, teth, lamed, nun, thau, expressed by דטלנת; and palatal, as *g*, *i*, *c*, *k*, ghimel, jod, caph, koph, expressed by גיכק.

Printers distinguish their letters into capital, majuscle, initial, or upper case letters, which serve for the titles of books, proper names, &c. And minuscule, small, or under-case letters; which are again divided, according to their size, into pearl, nonpareil, pica, great canon, &c. They have also their flourished letters, engraven on wood or metal, which take place of the illumined letters of the ancient manuscripts.

There are letters of various sizes, or bodies; each of which, again, are sometimes cast with the Roman, sometimes an Italic, and sometimes an English, or black letter face. There are also bodies with Greek, Hebrew, Arabic, the music face, &c.

Letters make the first part or elements of grammar; an assemblage of these compose syllables, of those words, and of these sentences.

The alphabet of every language consists of a certain number of these letters, which ought to have a different sound, figure, and signification.

As the difference of articulate sounds was intended to express the different ideas of the mind, so one letter was originally intended to signify only one sound, and not, as at present, to express sometimes one sound, and sometimes another; which practice has brought a great deal of confusion into the languages, and rendered the learning of the modern tongues infinitely more difficult than it would otherwise have been. This consideration, together with the poverty of all the known alphabets, and their want of some letters to express certain sounds by, has occasioned several attempts towards an universal alphabet, to contain an enumeration of all such single sounds or letters as are used in any language. A thing of very considerable use; a specimen of which is given us by Mr. Lodwick, in the Philosophical Transactions. See Universal Character.

According to Crinitus, Moses invented the Hebrew letters, Abraham the Syriac and Chaldee; the Phœnicians those of Attica, brought into Greece by Cadmus, and thence by the Pelasgians into Italy; Nicostrata the Latin; Isis the Egyptian; and Ulphilas, about three hundred and seventy years after our Saviour, those of the Goths.

Yet as to the first letters, what they were, who first invented them, and among what people they were first in use, there is still room to doubt; however, setting aside conjectures and prejudice, the business of antiquity seems to lie between the Egyptians and Chinese. Philo attributes the first invention of letters to Abraham; Josephus, St. Irenæus, and others, to Enoch; Bibliander, to Adam; Eusebius, Clement Alexandrinus. Corn. Agrippa, &c. to Moses;

Pomponius Mela, Herodian, Rufus Festus, Pliny, Lucan, &c. to the Phœnicians; St. Cyprian, to Saturn; Tacitus, to the Egyptians, &c. The most probable opinion is, that they were communicated by God himself to Moses, when he gave him the Decalogue. See LANGUAGE.

Grammarians distinguish letters into vowels, consonants, mutes, liquids, diphthongs, and characteristics. They are likewise divided into capital and small letters. They are also denominated from the shape and turn of the letters; and in writing are distinguished into different hands, as round-text, German-text, round-hand, Italian, &c. and in printing, into Roman, Italic, and black letter.

The term *Letter,* or *Type,* among printers, not only includes the CAPITALS, SMALL-CAPITALS, and small letters, but all the points, figures, and other marks cast and used in printing; and also the large ornamental letters, cut in wood or metal, which take place of the illumined letters used in manuscripts. The letters used in printing are cast at the ends of small pieces of metal, about three quarters of an inch in length; and the letter being not indented, but raised, easily gives the impression, when, after being blacked with a glutinous ink, paper is closely pressed upon it. See the articles PRINTING and TYPE. A fount of letters includes small letters, capitals, small capitals, points, figures, spaces, &c; but besides, they have different kinds of two-line letters, only used for titles, and the beginning of books, chapters, &c. See FOUNT.

LETTER, a writing addressed and sent to a person. See EPISTLE. The art of epistolary writing, as the translator of Pliny's Letters has observed, was esteemed by the Romans in the number of liberal and polite accomplishments; and we find Cicero mentioning with great pleasure, in some of his letters to Atticus, the elegant specimen he had received from his son of his genius in this way. It seems indeed to have formed part of their education; and, in the opinion of Mr. Locke, it well deserves to have a share in ours. "The writing of letters (as that judicious author observes) enters so much into all the occasions of life, that no gentleman can avoid shewing himself in compositions of this kind. Occurrences will daily force him to make this use of his pen, which lays open his breeding, his sense, and his abilities, to a severer examination than any oral discourse." It is to be wondered we have so few writers in our own language who deserve to be pointed out as models upon such an occasion. After having named Sir William Temple, it would perhaps be difficult to add a second. The elegant writer of Cowley's life mentions him as excelling in this uncommon talent; but as that author declares himself of opinion, "That letters which pass between familiar friends, if they are written as they should be, can scarce ever be fit to see the light," the world is deprived of what no doubt would have been well worth its inspection. A late distinguished genius treats the very attempt as ridiculous, and professes himself a mortal enemy to what they call a *fine letter.* His aversion, however, was not so strong, but he knew to conquer it when he thought proper; and the letter which closes his correspondence with bishop Atterbury is, perhaps, the most genteel and manly address that ever was penned to a friend in disgrace. The truth is, a fine letter does not consist in saying fine things, but in expressing ordinary ones in an uncommon manner. It is the *proprie communia dicere,* the art of giving grace and elegance to familiar occurrences, that constitutes the merit of this kind of writing. Mr. Gay's letter concerning the two lovers who were struck dead with the same flash of lighting, is a master-piece of the sort; and the specimen he has there given of his talents for this species of composition, makes it much to be regretted we have not more from the same hand. The letters of Cowper, Lady Mary Wortley Montague, and Miss Talbot, may also be mentioned as models in their respective kinds.

LETTER. A servant of the post-office is within the penalty of 5 Geo. III. c. 25, which makes it a capital felony to secrete a letter containing any bank-note, though he has not taken the oath required by 9 Anne c. 10. But to secrete a letter containing money, is not an offence within the statutes concerning the servants of the post-office.

The rate of postage of general-post letters is regulated by distance in the following proportions:

For every letter not exceeding 15 miles, 4*d*, 30 miles, 5*d*, 50 miles, 6*d*, 80 miles, 7*d*, 120 miles, 8*d*, 170 miles, 9*d*, 230 miles, 10*d*, 300 miles, 11*d*. Where the distance is under or above 100 miles, and more than 300 miles, an additional 1*d*, and so on for every further 100 miles; and all letters to and from Ireland conveyed by packet-boats shall be paid 2*d* above all other rates: for all letters to or from Portugal, or the British dominions in America, 1*s*; and to any places without the king's dominions, 4*d* additional; and all foreign letters must be charged with the full inland rates of postage.

No letter shall be rated higher than as a treble letter, if less than 1 oz. in weight, and if an oz. than as four single letters; and so in proportion of ¼ of an oz. as a letter. These rates were settled by 41 Geo. III. c. 7.

All letters on his majesty's business are free; also all peers and members of the house of commons may send daily 10 letters free and receive 15, not exceeding 1 oz. each in weight, provided the franked letters sent by them shall be indorsed with their name, and the date when the letters are put in written at full length, and the whole direction to be in the hand-writing of such member of parliament. Also, provided such member of parliament shall be within 20 miles of the post town, where letters are put in franked by him, or where letters are received directed to him. 43 Geo. III. c. 31.

LETTER OF ATTORNEY, is an instrument giving to a second person the authority to do

any lawful act in the stead of the maker. They are sometimes revokable and sometimes not; in the latter case the word irrevocable is inserted. The authority must be strictly pursued: and if the attorney does less than the power it shall be void; if more, it shall be good as far as the power goes, and void as to the rest; but both these rules have many exceptions. See 1 Inst. 258.

LETTER OF CREDIT, is where a merchant or correspondent writes a letter to another, requesting him to credit the bearer with a certain sum of money.

LETTER OF LICENCE, is a written permission granted to a person under embarassment, allowing him to conduct his affairs for a certain time without being molested. Such instrument will bind all the creditors by whom it is executed, and it generally contains certain stipulations to be observed by all parties.

LETTERS (Threatening). To send letters threatening to accuse a person of any crime punishable with death or any infamous punishment, and knowingly to send any anonymous or fictitious letter threatening to kill any, or to set fire to their tenements or property, with a view of extorting money or valuables from them, is in the first instance punishable with fine, imprisonment, pillory, whipping, or transportation for seven years, and in the other instance is felony without benefit of clergy.

LETTERS PATENT. See PATENTS, and EXEMPLIFICATION OF PATENTS.

LETTERS (Close), are grants of the king specially distinguished from letters patent, in that the letters close, being not of public concern, but directed to particular persons, are closed up and sealed.

LETTERS OF MARQUE, are extraordinary commissions, granted to captains or merchants for reprisals, in order to make a reparation for those damages they have sustained, or the goods they have been deprived of by strangers at sea.

These appear to be always joined to those of reprise, for the reparation of a private injury; but under a declared war the former only are required.

LE'TTER. *s.* (from *let.*) 1. One who lets or permits. 2. One who hinders. 3. One who gives vent to any thing: as, *a* blood *letter*.

To LE'TTER. *v. a.* (from the noun.) To stamp with letters (*Addison*).

LETTERED. *a.* (from *letter.*) Literate; educated to learning (*Collier*).

LETTUCE, in botany. See LACTUCA.

LETTUCE (Hare's). See SONCHUS.

LETTUCE (Lamb's). See VERONICA.

LETTUCE (Wild). See PRENANTHES.

LEVANT, properly signifies the quarter where the sun rises, but is generally applied to the coasts of Asia, along the Mediterranean, and especially Asiatic Turkey, from Alexandria in Egypt, to the Black Sea, and including the islands of Cyprus, Rhodes, and the Archipelago.

LEVANTINE VALLEY, a valley of Switzerland on the confines of Italy, lying between Mount St. Gothard and Lake Maggiore. It is divided into two parts by the river Tesino; and is eight leagues long, but the breadth inconsiderable. The lower part is populous, rich in pasturage, and produces much hemp and flax. The houses are entirely of wood, and have externally the appearance of Swiss cottages, but a neglect of cleanliness proves the vicinity and greater similarity to the Italians. It is a bailiwic, subject to the canton of Uri; and Ossogna, the residence of the bailiff, consists only of a few houses.

LEVATOR, in anatomy, a name given to various muscles, which act as levers in raising the limbs or organs.

LEVATOR ANGULI ORIS. (*levator*, from *levo*, to lift up; so named from its office, which is to lift up the part to which it is affixed.) Elevator labiorum communis of Douglas. Caninus of Winslow. A muscle situated above the mouth, which draws the corner of the mouth upwards, and makes that part of the cheek opposite to the chin prominent, as in smiling. It arises thin and fleshy from the hollow of the superior maxillary bone, between the root of the socket of the first grinder and the foramen infra orbitarium, and is inserted into the angle of the mouth and under lip, where it joins with its antagonist.

L. ani. This muscle arises from the os pubis, within the pelvis, as far up as the upper edge of the foramen thyroideum, and joining of the os pubis with the os ischium, from the thin tendinous membrane that covers the obturator internus and coccygæus muscles, from the spinous process of the ischium. From these origins all round the inside of the pelvis, its fibres run down like rays from a circumference to a center, to be inserted into the sphincter ani, acceleratores urinæ, and anterior part of the two last bones of the os coccygis, surrounding the extremity of the rectum, neck of the bladder, prostate gland, and part of the vesiculæ seminales. Its fibres joining with those of its fellow, form a funnel-shaped hole, that draws the rectum upwards after the evacuation of the fæces, and assists in shutting it. The levatores ani also sustain the contents of the pelvis, and assist in ejecting the semen, urine, and contents of the rectum, and perhaps, by pressing upon the veins, contribute greatly to the erection of the penis.

L. labii inferioris. Levator menti of Albinus. Incisivus inferior of Winslow. Elevator labii inferioris proprius of Douglas. A muscle of the mouth, situated below the lips: it arises from the lower jaw, at the roots of the alveoli of two incisor teeth and the cuspidatus, and is inserted into the under lip and skin of the chin.

L. labii superioris alæque nasi. Elevator labii superioris proprius of Douglas. Incisivus lateralis et pyramidalis of Winslow. A muscle of the mouth and lips, that raises the upper lip towards the orbit, and a little outwards; it serves also to draw the skin of the nose upwards and outwards, by which the nostril is di-

lated. It arises by two distinct origins; the first broad and fleshy from the external part of the orbitar process of the superior maxillary bone, immediately above the foramen infra orbitarium; the second from the nasal process of the superior maxillary bone, where it joins the os frontis. The first portion is inserted into the upper lip and orbicularis muscle, the second into the upper lip, and outer part of the ala nasi.

L. oculi. See RECTUS SUPERIOR OCULI.

L. palati. Levator palati mollis of Albinus. Petro-salpingo-staphilinus, vel salpingo-staphilinus internus vulgo of Winslow. Saplingo-staphilinus of Valsalva. Pterigo-staphilinus externus vulgo, of Douglas. Sphæno-staphilinus of Cowper. A muscle situated between the lower jaw and the os hyoides laterally. It arises tendinous and fleshy from the extremity of the petrous portion of the temporal bone, where it is perforated by the Eustachian tube, and also from the membranous part of the same tube, and is inserted into the whole length of the velum pendulum palati, as far as the root of the uvula, and unites with its fellow. Its use is to draw the velum pendulum palati upwards and backwards, so as to shut the passage from the fauces into the mouth and nose.

L. palati mollis. See LEVATOR PALATI.

L. palpebræ superioris. Aperiens palpebrarum rectus. Apertor oculi. A proper muscle of the upper eyelid, that opens the eye, by drawing the eyelid upwards. It arises from the upper part of the foramen opticum of the sphænoid bone, above the rectus superior oculi, near the trochlearis, and is inserted by a broad thin tendon into the cartilage that supports the upper eyelid.

L. parvus. See TRANSVERSUS PERINÆI.

L. scapulæ. A muscle situated on the posterior part of the neck, that pulls the scapula upwards, and a little forwards. This name, which was first given to it by Riolanus, has been adopted by Albinus. Douglas calls it elevator seu musculus patientiæ; and Winslow, angularis vulgo levator proprius. It is a long muscle, nearly two inches in breadth, and is situated obliquely under the anterior edge of the trapezius. It arises tendinous and fleshy from the transverse processes of the four, and sometimes five superior vertebræ colli, by so many distinct slips, which soon unite to form a muscle that runs obliquely downwards and outwards, and is inserted by a flat tendon into the upper angle of the scapula. Its use is to raise the scapula upwards and a little forwards.

LEUCANTHEMUM VULGARE. (λευκανθεμον, from λευκος, white, and ανθεμος, a flower, so called from its white floret.) See BELLIS MAJOR.

LEUCAS or LEUCADIA, an island of the Ionian sea, now called St. Maura, near the coast of Epirus, famous for a promontory whence desponding lovers threw themselves into the sea. The word is derived from λευκος, white, on account of the whiteness of its rocks. Sappho had recourse to this leap, called Leucates, to free herself from the violent passion which she entertained for Phaon. Apollo had a temple on the promontory, whence he is often called Leucadius.

LEUCATE, a town of France, in the department of Aude, 18 miles south of Narbonne. Lon. 3. 9 E. Lat. 43. 0 N.

LEUCE, a small island in the Euxine sea, between the mouths of the Danube and the Borysthenes. According to the poets, the souls of the ancient heroes were placed there as in the Elysian fields, where they enjoyed perpetual felicity. From that circumstance, it has often been called the island of the blessed, &c.

LEUCHTENBERG, a town of Germany, in the upper palatinate of Bavaria, seated on a mountain, near the river Esreimpt, 50 miles N. W. of Ratisbon. Lon. 12. 26 E. Lat. 49. 40 N.

LEUCIPPUS. Ancient writers have recorded many of this name. The following are the most celebrated——1. A philosopher of Abdera, about 428 years before Christ, disciple to Zeno. He was the first who invented the famous system of atoms and of a vacuum, which was afterwards more fully explained by Democritus and Epicurus. Many of his hypotheses have been adopted by the moderns, with advantage.——2. A brother of Tyndarus, king of Sparta, who married Philodice daughter of Inachus, by whom he had two daughters, Hilaira and Phœbe, known by the patronymic of Leucippides. They were carried away by their cousins Castor and Pollux, as they were going to celebrate their nuptials with Lynceus and Idas.——3. A son of Xanthus, descended from Bellerophon, who became enamoured of his sister, who yielded to him at the solicitation of her mother. This unnatural intrigue eventually proved the cause of the death of both.——4. A son of Œnomaus, who became enamoured of Daphne, and to obtain her confidence, disguised himself in a female dress, and attended his mistress as a companion. He gained the affections of Daphne by his obsequiousness and attention, but his artifice at last proved fatal, for when Daphne and her attendants were bathing in the Ladon, the sex of Leucippus was discovered, and he perished by the darts of the females.

LEUCITE, in mineralogy. See SCORLUS.

LEUCOJUM, great snow-drop, a genus of the monogynia order, in the hexandria class of plants, and in the natural method ranking under the ninth order, spathaceæ. Corol campanulate, sexpartite, segments increased at the points, stigma simple. The species are, 1. L. vernum, or spring leucojum, which has an oblong bulbous root, sending up a naked stalk, about a foot high, terminated by a spathe, protruding one or two white flowers, appearing in March. 2. L. æstivum, or summer leucojum; has a large oblong bulbous root, an upright stalk, 15 or 18 inches high, terminated by many white flowers in May. 3. L. autumnale has a large oblong bulbous root, narrow leaves, an upright stalk, terminated by white flowers in autumn.

4. L. sumosum, with flowers white within, purplish without.

LEUCOMA. (*leucoma*, λευκωμα, from λευκος, white.) A variety of the caligo cornea of Cullen's nosology. See CALIGO.

LEUCONYMPHÆA. (*leuconymphæa*, λευκονυμφαια, from λευκος, white, and νυμφαια, the water lily.) See NYMPHÆA ALBA.

LEUCOPHLE'GMACY. *s.* (from *leucophlegmatick.*) Paleness, with viscid juices and cold sweatings (*Arbuthnot*).

LEUCOPHLEGMATIC. (*leucophlegmasia*, from λευκος, white, and φλεγμα, phlegm.) A term applied by the older medical writers to a dropsical habit of body.

LEU'COPTERA. In zoology, a genus of the class vermes, order infusoria. Worm invisible to the naked eye, every where ciliate. Eight species: four found in the waters or marshes of our own country.

1. L. conflictor. Sphærical, subopake, with moveable intestines. Inhabits clear water; yellowish with dark edges, and filled with most minute molecules in perpetually violent agitation.

2. L. cornuta. Inversely conic, green, opake. Inhabits the marshy grounds of our own country; body broad and truncate on the fore-part with a small spine on each side; the hind-part pellucid and pointed: sometimes it appears oval or kidney-shaped, and when the water which contains it evaporates, it breaks into molecular vesicles.

3. L. nodulata. Ovate-oblong, depressed, with a double row of tubercles. Found in the intestines of the lumbricus terrestris, and nais littoralis; very pellucid, shining like silver, and propagated by a transverse division; oval when young, but more oblong when in age, truncate at the tip.

LEUCOPIPER. (*leucopiper*, λευκοπιπερ, from λευκος, white, and πιπερις, pepper.) See PIPER NIGRUM.

LEUCOPSIS. In zoology, a genus of the class insecta, order hymenoptera. Mouth horny with sharp jaws, the mandible thick and three-toothed at the tip; lip longer than the jaw, membranaceous, and emarginate at the tip; feelers four, short, equal, filiform; antennas short, clavate; thorax with a long lanceolate scale beneath; wings folded; sting reflected and concealed in a groove of the abdomen. Four species: three south of Europe, one Tranquebar.

LEUCORRHŒA. (*leucorrhœa*, λευκορροια, from λευκος, white, and ρεω, to flow.) Fluor albus. The whites. An increased secretion of white mucus from the vagina of women, arising from debility, and not from the venereal virus.

LEUCOSIA, a small island in the Tyrrhene sea. It received its name from one of the companions of Æneas, who was drowned there, or from one of the Sirens, who was thrown there by the sea. (*Strab. Ovid.*)

LEUCOTHOE, or LEUCOTHEA, the wife of Athamas, changed into a sea deity. (See INO.) She was called Matura by the Romans: —2. A daughter of king Orchamus, by Eurynome. Apollo became enamoured of her, and to introduce himself to her, assumed the shape and features of her mother. Their happiness was complete, when Clytia, who was jealous of his amour, discovered the intrigue to her father, who ordered his daughter to be buried alive. The lover, unable to save her from death, sprinkled nectar and ambrosia on her tomb, which penetrating as far as the body, changed it into a beautiful tree, which bears the frankincense. (*Ovid.*)

LEUCTRA, a village of Bœotia, between Platæa and Thespia, famous for the victory which Epaminondas, the Theban general, obtained over the superior force of Cleombrotus, king of Sparta, on the 8th of July, B. C. 371. In this famous battle 4000 Spartans were killed, with their king Cleombrotus, and no more than 300 Thebans. From that time the Spartans lost the empire of Greece, which they had obtained for near 500 years.

LE'VEE. *s.* (French.) 1. The time of rising. 2. The concourse of those who crowd round a man of power in a morning (*Dryd.*).

LE'VEL. *a.* (læpel, Saxon.) 1. Even; not having one part higher than another (*Bentl.*). 2. Even with any thing else; in the same line or plane with any thing (*Tillotson*). 3. Having no gradations of superiority (*Bentley*).

To LE'VEL. *v. a.* (from the adjective.) 1. To make even; to free from inequalities. 2. To reduce to the same height with something else (*Dryden*). 3. To lay flat (*Raleigh*). 4. To bring to equality of condition (*D. of P.*). 5. To point in taking aim; to aim (*Dryd.*). 6. To direct to any end (*Swift*). 7. To suit; to proportion (*Dryden*).

To LE'VEL. *v. n.* 1. To aim at; to bring the gun or arrow to the same line with the mark (*Hooker*). 2. To conjecture; to attempt to guess (*Shakspeare*). 3. To be in the same direction with a mark (*Hudibras*). 4. To make attempts; to aim (*Shakspeare*). 5. To efface distinction or superiority.

LE'VEL. *s.* (from the adjective.) 1. A plane, a surface without protuberances or inequalities (*Sandys*). 2. Rate; standard; customary height (*Sidney*). 3. Suitable or proportionate height (*Daniel*). 4. A state of equality (*Atterbury*). 5. An instrument whereby masons adjust their work (*Moxon*). 6. Rule; plan; scheme: borrowed from the mechanic level (*Prior*). 7. The line of direction in which any missive weapon is aimed (*Waller*). 8. The line in which the sight passes (*Pope*).

LEVEL, an instrument used to make a line parallel to the horizon, and to continue it out at pleasure; and by this means to find the true level, or the difference of ascent or descent between two or more places, for conveying water, draining fens, &c.

There are several instruments, of different contrivance and matter, invented for the perfection of levelling, as may be seen in De la Hire's and Picard's treatises of Levelling, in Biron's treatise on Mathematical Instruments,

Fig. 1.

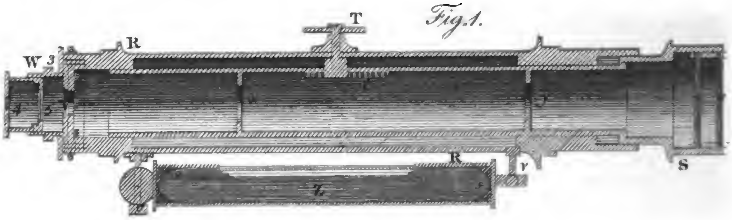
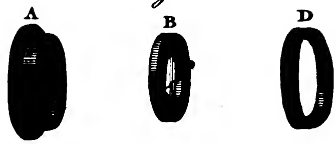


Fig. 2.

Fig. 3.



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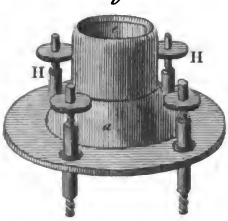


Fig. 5.

Fig. 6.

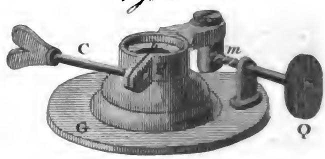
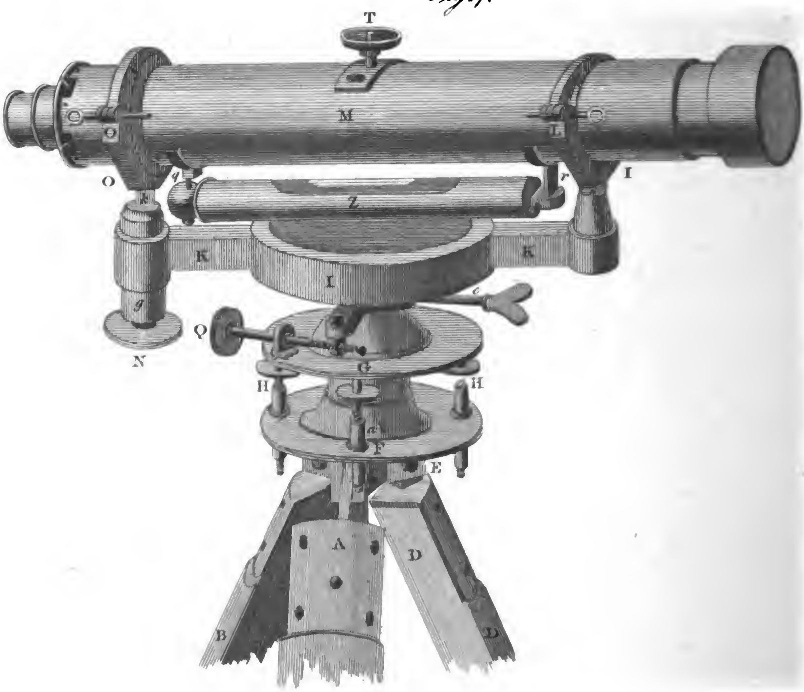


Fig. 7.



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also in the Philos. Trans. and the Memoirs de l'Acad. &c. But they may be reduced to the following kinds.

Level (Water), that which shews the horizontal line by means of a surface of water or other fluid; founded on this principle, that water always places itself level or horizontal.

The most simple kind is made of a long wooden trough or canal; which being equally filled with water, its surface shews the line of level. And this is the chorobates of the ancients, described by Vitruvius, lib. viii. cap. 6.

The water-level is also made with two cups fitted to the two ends of a straight pipe, about an inch diameter, and three or four feet long, by means of which the water communicates from the one cup to the other; and this pipe being moveable on its stand by means of a ball and socket, when the two cups shew equally full of water, their two surfaces mark the line of level.

This instrument, instead of cups, may also be made with two short cylinders of glass three or four inches long, fastened to each extremity of the pipe with wax or mastic. The pipe is filled with common or coloured water, which shews itself through the cylinders, by means of which the line of level is determined; the height of the water, with respect to the centre of the earth, being always the same in both cylinders. This level, though very simple, is yet very commodious for levelling small distances. See the method of preparing and using a water-level, and a mercurial level, annexed to Davis's quadrant, for the same purpose, by Mr. Leigh, in Philos. Trans. vol. xl. 417, or Abr. viii 362.

Where works of moderate extent are carried on, and where the perfect level of each stratum of materials is not an object of importance, the common bricklayer's level, made in the form of an inverted T, thus ⊥, having a plumb suspended from the top, and received in an opening at the junction of the perpendicular with the horizontal piece, will answer well enough. The principle on which this acts, is, that as all weights have a tendency to gravitate towards the centre of the earth, so, as the plumb line is a true perpendicular, any line cutting that at right angles must be a horizontal line at the point of intersection.

Level (Artillery-foot), is in form of a square, having its two legs or branches of an equal length, at a juncture whereof is a little hole, whence hangs a thread and plummet, playing on a perpendicular line in the middle of a quadrant. It is divided into twice forty-five degrees from the middle.

This instrument may be used on other occasions, by placing the ends of its two branches on a plane; for when the thread plays perpendicularly over the middle division of the quadrant, that plane is assuredly level. To use it in gunnery, place the two ends on the piece of artillery, which you may raise to any proposed height, by means of the plummet, whose thread will give the degree above the level.

Level (Gunner's), consists of a long ruler, in the middle whereof is fitted, at right angles, another somewhat stouter, furnished with a plum, met and index, in order to show the different degrees of elevation of pieces of artillery. This instrument has also a brass foot, to set upon cannons or mortars, so as when those pieces are horizontal, the instrument will be perpendicular. The foot of this instrument is to be placed on the piece to be elevated, in such a manner as that the point of the plummet may fall on the proper degree: this is what they call levelling the piece.

Level (Mason's), is composed of three rules, so joined as to form an isosceles-triangle, somewhat like a Roman A, at the vertex whereof is fastened a thread, from which hangs a plummet, that passes over a fiducial line, marked in the middle of the base, when the thing, to which the level is applied, is horizontal; but declines from the mark, when the thing is lower on one side than on the other.

Level (Plumb or pendulum), that which shews the horizontal line by means of another line perpendicular to that described by a plummet or pendulum. This instrument consists of two legs or branches, joined together at right angles, whereof that which carries the thread and plummet is about a foot and a half long; the thread is hung towards the top of the branch. The middle of the branch where the thread passes is hollow, so that it may hang free every where: but towards the bottom, where there is a little blade of silver, whereon is drawn a line perpendicular to the telescope, the said cavity is covered by two pieces of brass, making as it were a kind of case, lest the wind should agitate the thread; for which reason the silver blade is covered with a glass to the end, that it may be seen when the thread and plummet play upon the perpendicular The telescope is fastened to the other branch of the instrument, and is about two feet long; having an hair placed horizontally across the focus of the object-glass, which determines the point of the level. The telescope must be fitted at right angles to the perpendicular. It has a ball and socket, by which it is fastened to the foot.

Level (Air), that which shews the line of level by means of a bubble of air inclosed with some fluid in a glass tube of an indeterminate length and thickness, and having its two end hermetically sealed: an invention, it is said, os M. Thevenot. When the bubble fixes itse at a certain mark, made exactly in the middllf of the tube, the case or ruler in which it ise fixed is then level. When it is not level, the bubble will rise to one end.—This glass tube may be set in another of brass, having an aperture in the middle, where the bubble of air may be observed.—The liquor with which the tube is filled is oil of tartar, or aqua secunda; those not being liable to freeze as common water, nor to rarefaction and condensation as spirit of wine is.

The most complete air or spirit level, is that invented by the late truly scientific artist Jesse Ramsden. The following description of one of his levels we transcribe from Gregory's

Dictionary of Arts and Sciences. In Plate 94, A, B, D, fig. 7, are the three legs upon which it is placed; when shut up, they form one round rod, and are kept together by three rings: these legs are jointed to a brass frame E, on the top of which is a male screw, screwing into a female screw within the projection *a* of the plate F. Within the top of *a*, figs. 4 and 7, is a hemispherical cavity to contain the spherical ball, fig. 5: this ball has a male screw *d* on its top, which screws into a female screw *b*, fig. 6, in the plate G, fig. 7 and fig. 6, the ball is put up through an opening *e*, fig. 4, and screwed to the plate, fig. 6; so that the upper plate G can move in any direction within certain limits by the play of the ball in its socket; to confine the upper plate G when it is set in any direction, four screws, HHHH, figs. 4 and 7, are employed; they work in tubes firmly fixed to the plate F, and are turned by their milled heads; the upper ends of these screws act against the under side of the plate, fig. 6, as shewn in fig. 7; so that when the plate G is required to be moved in any direction, it is done by screwing up one screw and screwing down the opposite till it is brought to the proper inclination; then by screwing up both together, the plate is firmly fixed. The ball, fig. 5, has a conical hole *f* through it, to receive an axis which is screwed fast to the bottom of the compass-box I, fig. 7; a screw screwed into the end of this axis prevents its being lifted out, and at the same time leaves it at liberty to turn round independent of the ball, fig. 5. On each side of the compass-box, I, is a bar KK, on the end of which are fixed two forked pieces IO, called the Y's (from their resemblance to that letter), carrying the telescope M. One of these (O) is capable of being raised or lowered by means of a milled-headed screw N, which works through a collar in the lower end of the tube *g*; the rest of the tube has a triangular hole through it, in which slides a bar *k*, which is part of the Y; O the female screw is cut within this bar, and the screw works into it, so that by turning the milled head one way, the Y is raised, and by reversing the motion, it is lowered. The axis which connects the compass-box and the other apparatus, has a collar upon it just above where it enters the ball, fig. 5, which is embraced by a clamp P, fig. 6, which is closed by a screw C, so as to hold the collar of the axis quite tight; and when the screw is turned back, its own elasticity opens it so as to allow the axis of the compass-box to turn round freely within it; on the opposite side of the clamp is a projecting arm *l*, carrying the nut *m* of the screw Q, which screw works in a stud *n*, fixed to the upper plate G, figs. 7 and 6: by this means, when G is loosened, the telescope can be turned quite round, but when it is fastened, it can only be moved by turning the screw Q. The level-tube Z is fastened to the under side of the telescope by a screw *q* at one end and a bar *r* at the other: the use of these are to adjust it so that it shall be exactly parallel to the axis of the telescope-tube. The level, as best explained in the section, fig. 1, is a tube of glass *ss*, nearly filled with spirits of wine, but so as to leave a bubble of air in it; if the tube is of exactly the same diameter in every part, the bubble will rest in the middle of the tube when it is level. In some of the best levels made by Ramsden, the inside of the tube is bent into a segment of a circle, 100 feet diameter, and the inside is ground, which causes the bubble to adhere together; if the tube is straight, it is liable to divide into several small ones. The internal parts of the telescope are explained in fig. 1: RR is the external tube of brass plate; within this slides another tube *ss*; it has two glasses *v*, *w*, screwed into the outer end, called object-glasses, and it has two divisions *x*, *y*, called diaphagram, with small holes in them; their use is to collect the prismatic rays with which the objects would otherwise be tinged; the tube *ss* has a rack *t* fixed nearly in the middle of it, which takes into a pinion on the axis of the milled head T, figs. 1 and 7; by turning this, the glasses *v*, *w*, can be moved nearly to, or farther from, the eye to adjust the focus; to the tube R at *v* are fixed the cross wires, whose intersection is exactly in the centre of the tube. The manner of fixing these is explained in fig. 3: A is a brass box, which fits into the end of the telescope-tube, and is held there by four small screws; within this box is placed a brass plate B, carrying the wires, which are fastened by screwing four screws down upon their ends; when the plate B is in the box, a ring D is screwed in upon it, which prevents its falling out, but at the same time leaves it at liberty to move about in the box; the sides of the box, and also the telescope-tube, has four rectangular holes in it, through which four screws are passed into the edges of the piece B, so as to hold it in any position: these screws come through the external tube, and have square heads, to be turned by a key, so as to adjust the interactions in the centre: the box A has a female screw in the front, into which is screwed the eye-piece W; 3 is the tube which is screwed to the telescope; within this slides a tube, containing two glasses 4, 5; by sliding the glasses in or out of the tube 3, they can be adjusted so as to adapt their focus to the cross wires. This eye-piece is convenient on account of its shortness; but as it reverses the objects, it is sometimes more convenient to use the eye-piece fig. 2. which is much longer, but does not reverse objects. *a* is the tube which is screwed to the telescope; within this slides another tube *bb*, having at one end a tube *dd*, containing two glasses *ef*, and a diaphagram *g*, and at the other end a tube *hh*, containing two glasses *ik*, and a diaphagram: *m* is a cap screwed on to the end to prevent the tubes coming out. When the instrument is to be carried, the level is unscrewed from the legs and packed in a case; the legs are shut up and kept so by the rings, as before described. The manner of using this instrument is as follows: When the difference of level between any two places is required, the observer with the level goes to the highest of the two,

and his assistant goes to the lowest with the target, which is a long pole of wood with a groove in it, in which slides a small rod carrying a round piece of wood, called a sight, which is to be observed through the telescope: the observer opens the legs of the instrument, and sets them on the ground; the level is next screwed to them at E, as shewn in fig. 7; the telescope is then brought nearly to a level by the screws HHHH, as before described; the screw *c* is then turned so as to release the clamp P, fig. 6; and the telescope is turned about, so as to point to the target; the clamp P is then closed, the observer looks through the telescope, and by turning the nut T, the focus is adjusted: the screw Q is then turned till the cross wires are brought to coincide with the object, in an horizontal plane; he then takes his eye from the telescope, and works the screw N till he brings the bubble of air in the level-tube exactly in the middle, which shews that the telescope is perfectly horizontal; the observer then makes signals to the assistant to raise or lower the sight on the slider of the target, till it is brought to coincide with the intersection of the cross wire, which shews that the telescope and the sight of the target are on the same level; the height which the sight is from the ground where the target stands, deducted from the height the telescope stands from the ground, is the difference of level required.

LEVEL TOPPED, in botany. See FASTIGIATE.

LE'VELLER. *s.* (from *level.*) 1. One who makes any thing even. 2. One who destroys superiority; one who endeavours to bring all to the same state of equality (*Collier*).

LEVELLING, the art or act of finding a line parallel to the horizon at one or more stations, to determine the height or depth of one place with respect to another; for laying out grounds even, regulating descents, draining morasses, conducting water, &c.

Two or more places are on a true level when they are equally distant from the centre of the earth. Also one place is higher than another, or out of level with it, when it is farther from the centre of the earth; and a line equally distant from that centre in all its points, is called the line of true level. Hence, because the earth is round, that line must be a curve, and make a part of the earth's circumference, or at least be parallel to it, or concentrical with it; as the line BCFG (Plate 93, fig. 10), which has all its points equally distant from A, the centre of the earth, considering it as a perfect globe.

But the line of sight BDE, &c. given by the operations of levels, is a tangent, or a right line perpendicular to the semidiameter of the earth at the point of contact B, rising always higher above the true line of level, the farther the distance is, is called the apparent line of level. Thus, CD is the height of the apparent level above the true level, at the distance BC or BD; also EF is the excess of height at F, and GH at G, &c. The difference, it is evident, is always equal to the excess of the secant of the arch of distance above the radius of the earth.

The common methods of levelling are sufficient for laying pavements of walks, or for conveying water to small distances, &c.; but in more extensive operations, as in levelling the bottoms of canals, which are to convey water to the distance of many miles, and such like, the difference between the true and the apparent level must be taken into the account.

Now the difference CD between the true and apparent level, at any distance BC or BD, may be found thus: By a well-known property of the circle, $(2AC + CD) : BD :: BD : CD$; or because the diameter of the earth is so great with respect to the line CD at all distances to which an operation of levelling commonly extends, that 2AC may be safely taken for $2AC + CD$ in that proportion without any sensible error, it will be $2AC : BD :: BD : CD$, which therefore is $= \frac{BD^2}{2AC}$, or $\frac{BC^2}{2AC}$ nearly; that is, the difference between the true and apparent level, is equal to the square of the distance between the places, divided by the diameter of the earth; and consequently it is always proportional to the square of the distance.

Now the diameter of the earth being nearly 7958 miles; if we first take $BC = 1$ mile, then the excess $\frac{BC^2}{2AC}$ becomes $\frac{1}{7958}$ of a mile, which is 7.962 inches, or almost eight inches, for the height of the apparent above the true level at the distance of one mile. Hence, proportioning the excesses in altitude according to the squares of the distances, the following table is obtained, shewing the height of the apparent above the true level for every 100 yards of distance on the one hand, and for every mile on the other.

Dist. or BC.	Dif. of Level, or CD.	Dist. or BC.	Dif. of Level, or CD.
Yards.	Inches.	Miles.	Feet. Inc.
100	0.026	$\frac{1}{4}$	0 $0\frac{1}{2}$
200	0.103	$\frac{1}{2}$	0 2
300	0.231	$\frac{3}{4}$	0 $4\frac{1}{2}$
400	0.411	1	0 8
500	0.643	2	2 8
600	0.925	3	6 0
700	1.260	4	10 7
800	1.645	5	16 7
900	2.081	6	23 11
1000	2.570	7	32 6
1100	3.110	8	42 6
1200	3.701	9	53 9
1300	4.344	10	66 4
1400	5.038	11	80 3
1500	5.784	12	95 7
1600	6.580	13	112 2
1700	7.425	14	130 1

By means of this table of reductions, we can now level to almost any distance at one operation, which the ancients could not do but by a

great multitude; for, being unacquainted with the correction answering to any distance, they only levelled from one twenty yards to another, when they had occasion to continue the work to some considerable extent.

This table will answer several useful purposes. Thus, first, to find the height of the apparent level above the true, at any distance. If the given distance is in the table, the correction of level is found on the same line with it: thus at the distance of 1000 yards, the correction is 2·57, or two inches and a half nearly; and at the distance of 10 miles, it is 66 feet 4 inches. But if the exact distance is not found in the table, then multiply the square of the distance in yards by 2·57, and divide by 1,000,000, or cut off six places on the right for decimals; the rest are inches: or multiply the square of the distance in miles by 66 feet 4 inches, and divide by 100.

2dly, To find the extent of the visible horizon, or how far can be seen from any given height, on a horizontal plane, as at sea, &c. Suppose the eye of an observer, on the top of a ship's mast at sea, is at the height of 130 feet above the water, he will then see about 14 miles all around. Or from the top of a cliff by the sea-side, the height of which is 66 feet, a person may see to the distance of near 10 miles on the surface of the sea. Also, when the top of a hill, or the light in a light-house, or such like, whose height is 130 feet, first comes into the view of an eye on board a ship, the table shews that the distance of the ship from it is fourteen miles, if the eye is at the surface of the water; but if the height of the eye in the ship is 80 feet, then the distance will be increased by near eleven miles, making in all about twenty-five miles in distance.

3dly, Suppose a spring to be on one side of a hill, and a house on an opposite hill, with a valley between them, and that the spring seen from the house appears by a levelling instrument to be on a level with the foundation of the house, which suppose is at a mile distance from it; then is the spring eight inches above the true level of the house; and this difference would be barely sufficient for the water to be brought in pipes from the spring to the house, the pipes being laid all the way in the ground.

4th, If the height or distance exceed the limits of the table, then, first, if the distance be given, divide it by 2, or by 3, or by 4, &c. till the quotient come within the distances in the table; then take out the height answering to the quotient, and multiply it by the square of the divisor, that is, by 4, or 9, or 16, &c. for the height required: so if the top of a hill is just seen at the distance of 40 miles, then 40 divided by 4 gives 10, to which in the table answer $66\frac{1}{3}$ feet, which being multiplied by 16, the square of 4, gives $1061\frac{1}{3}$ feet for the height of the hill. But when the height is given, divide it by one of these square numbers 4, 9, 16, 25, &c. till the quotient come within the limits of the table, and multiply the quotient by the square root of the divisor, that is by 2, or 3, or 4, or 5, &c. for the distance sought: so when the top of the peak of Teneriffe, said to be almost three miles, or 15840 feet high, just comes into view at sea, divide 15840 by 225, or the square of 15, and the quotient is 70 nearly; to which in the table answers by proportion nearly $10\frac{2}{7}$ miles; then multiplying $10\frac{2}{7}$ by 15, gives 154 miles and $\frac{2}{7}$, for the distance of the hill.

All that has been previously stated has been said without any regard to the effect of refraction in elevating the apparent places of objects. But as the operation of refraction in incurvating the rays of light proceeding from objects near the horizon is very considerable, it can by no means be neglected, when the difference between the true and apparent level is estimated at considerable distances. It is now ascertained (see Refraction) that for horizontal refractions the radius of curvature of the curve of refraction is about seven times the radius of the earth; in consequence of which the distance at which an object can be seen by refraction is to the distance at which it could be seen without refraction, nearly as 14 to 13, the refraction augmenting the distance at which an object can be seen by about a thirteenth of itself. By reason of this refraction, too, it happens, that it is necessary to diminish by $\frac{1}{7}$ of itself the height of the apparent above the true level, as given in the preceding table of reductions. Thus, at 1000 yards, the true difference of level when allowance is made for the effect of refraction, will be $2{\cdot}570 - {\cdot}367 = 2{\cdot}203$ inches. At two miles it would be $32 - 4\frac{4}{7} = 27\frac{3}{7}$ inches; and so on.

Mr. Prony has given at the end of his Architecture Hydraulique a table computed on this principle, extending from 50 to 6000 French toises, and shewing, in three distinct columns, the difference between the true and apparent levels, first without regarding refraction, next considering it, and then a column shewing the difference of the results. This table is almost entirely useless; yet the author of the article Levelling in the Encyclopædia Britannica has faithfully transcribed it without acknowledgment; and as it would seem, without being aware, that on account of the different ratios subsisting between the French toise and the radius of the earth, and six English feet and the same measure, the table as given in English is too inaccurate to be depended upon, even were it of use.

To find the height H of a mountain, its angle of apparent elevation (E), the arc A of a great circle of the earth included between the foot of the mountain and the place of the observer, and the apparent angle C made at the top of the mountain between the plumb-line and the apparent first place of the observer on the earth's surface, M. Lambert gave this theorem, R being the radius of the earth:

$$R + H = \frac{R \sin(90 + E - \frac{1}{11}A)}{\sin(C - \frac{1}{11}A)}:$$

whence H is immediately found. Other formulæ are deduced by M. Laplace for the same purpose; but they are too complex to be inserted here.

We must now give a few directions respecting the practice of levelling.

Levelling is either *simple* or *compound*. The former is when the level points are determined from one station, whether the level be fixed at one of the points or between them. Compound levelling is nothing more than a repetition of many simple operations.

An example of simple levelling is given in Pl. 95. fig. 1. where A B are the station-points of the level; C D the two points ascertained. Let the height

	Feet.	Inches.	
From A to C be - - -	6	0	0
From B to D be - - -	9	0	0
The difference - - -	3	0	0

shows that B is three feet lower than A.

If the station-points of the level are above the line of sight, as in fig 2. and the distance from A to C be six feet, and from B to D nine feet, the difference will still be three feet which B is higher than A.

As an example of compound levelling, suppose it were required to know the difference of height between the point A on the river Zome, and N on the river Belann, fig. 3. (copied from M. le Febure.) In this operation stakes should be driven down at A and N, exactly level with the surface of the water; and these stakes should be so fixed, that they may not be changed until the whole operation be finished: a plan of the ground between the two rivers should then be made, by which it will be discovered, that the shortest way between the rivers is by the dotted line AC, CH, HN; from whence also the number of stations necessary to be taken will be determined. The operator will also be enabled to distribute them properly according to the nature and situation of the ground. In the figure 12. stations are marked. Stakes ought then to be driven in at the limits of each station, as A, B, C, D, &c. They ought to be about two or three inches above the ground, and driven 18 inches into it. Stakes should also be driven in at each station of the instrument, as 1, 2, 3, 4, &c.

The operation may be begun in the following manner: Let the first station be at 1, equally distant from the two points A and B, which themselves are distant 166 yards. Write down then in one column the first limit A; in another, the number of feet, inches, and tenths: with the points of sight indicated on the station-staff at A. viz. 7. 6. 0. In the third column, the second limit B; in the fourth, the height indicated at the station-staff B, viz. 6. 0. 0. Lastly, in the fifth column, the distance from one station-staff to the other; which in this case is 166 yards. Remove now the level to the point marked 2, which is in the middle between B and C, the two places where the station-staves are to be held; observing that B, which was the second limit in the former operation, is the first in this. Then write down the observed heights as before; in the first column B; in the second 4. 6. 0; in the third C; in the fourth 5. 6. 2; in the fifth 560, the distance between B and C.

It being impossible, on account of the inequality of the ground at the third station, to place the instrument in the middle between the two station-staves, find the most convenient point, as at 3; then measure exactly how far this is from each station-staff, and you will find that from 3 to C is 160 yards; from 3 to D, 80 yards; and the remainder of the operation will be as in the preceding station.

In the fourth operation, we must endeavour to compensate for any error which might have happened in the last. Mark out, therefore, 80 yards from the station-staff D to the point 4; and 160 yards from 4 to E; and this must be carefully attended to, as by such compensations the work may be much facilitated. Proceed in the same manner with the eight remaining stations, observing to enter every thing in its proper column; and when the whole is finished, add the sums of each column together, and then subtract the lesser from the greater: the difference, which in the present case is 5. 4. 8. shows the ground at N to be thus much lower than the ground at A.

To obtain a section of this level, draw the dotted line *o o*, fig. 4. either above or below the plan; which may be taken for the level or horizontal line. Let fall then perpendiculars upon this line from all the station-points and places where the station-staves were fixed. Beginning now at A, set off 7 feet 6 inches upon the line from A to *a*: for the height of the level-point determined on the staff at this place, draw a line through *a* parallel to the dotted line *o o*, which will cut the third perpendicular at *b*, the second station-staff. Set off from this point downwards six feet to B, which shows the second limit of the first operation; and that the ground at B is one foot six inches higher than at A: place your instrument between these two lines at the height of the level line, and trace the ground according to its different heights. Now set off, on the second station-staff B, four feet six inches to C, the height determined by the level at the second station; and from C draw a line parallel to *o o*, which will cut the fifth perpendicular at *d*, the third station-staff. From this point set off 5 feet 6 inches $\frac{7}{10}$ downwards to C, which will be our second limit with respect to the preceding one, and the third with respect to the first. Then draw your instrument in the middle between B and C, and delineate the ground with its inequalities. Proceed in the same manner from station to station, till you arrive at the last N, and you will have the profile of the ground over which the level was taken.

This method answers very well where only a general profile of the different stations is required; but where it is necessary to have an exact detail of the ground between the limits, we must then go to work more particularly. Suppose, therefore, the level to have been taken from A to N by another route, but on more uniform

ground, in order to form a canal marked O, P, Q, R, S, T, U, X, Y. Draw at pleasure a line Z, Y, fig. 5. to represent the level, and regulate the rest; then let fall on this line perpendiculars to represent the staves at the limits of each station, taking care that they be fixed accurately at their respective distances from each other. The difference between the extreme limits, in this case, ought to be the same as in the former, viz. 5 feet 4 inches $\frac{7}{8}$. Set off this measure upon the perpendicular *o* the first limit; and from *o*, prolonging the perpendicular, mark off at *a* the height determined at the first station-staff; then do the same with the second and third, and so on with the following, till this part of the work is finished: there remains then only to delineate in detail the ground between the station-staves, the distances in this example being assumed larger on account of the detail.

To obtain the section of the ground between O and P, place your instrument at one of the limits, as P, fixing it so that the cross hairs may answer to the point C; then look towards the first limit *o*, raising or depressing the vane till it coincides with the intersection of the cross hairs; and the line of sight from one point to the other will mark the level or horizontal line.

To set off the height of the brink of the river above the first limit, drive a stake down close to the ground at *a*; and place your station-staff upon it, observing where the hairs intersect the vane, which will be at 4 feet 10 inches; then, laying off upon the line *oz* the distance from the first to the last stake, let fall from thence a perpendicular, and set off thereon 4. 10. 0 to *a*, which gives the height at the first stake; or, which is the same, the height from the edge of the river above the surface of the water, as is evident from the section. Drive a second stake at 6, in a line between the limits; place the station-staff upon this stake, and observe the height 4. 6. intersected by the cross hairs, the instrument still remaining in the same situation. Set off on the level-line the distance from the first stake *a* to the second *b*; and then let fall a perpendicular, and mark upon it 4. 6. to *b*, which gives the height of the ground at this place.

The small hollow *c* is marked out by driving down a third stake even with the ground, in the middle of it at *c*; but the exact distance of the second stake *b* from the third *c*, must be marked upon the level line: then let fall a perpendicular from *c*, and set off upon it 6. 8. 0, pointed out by the cross hairs on the staff, which determines the depth of the hollow, as appears from the figure. As the distances between the stakes are now very short, they can easily be marked by the operator, who can settle any little inequalities by a comparison with those already ascertained. Proceed thus with the other stations till you arrive at the last, and you will always obtain an accurate section of your work; by which it is easy to form a just estimation of the land to be dug away, in order to form the canal, by adding the depth to be given to it.

Fig. 6. gives an example of compound levelling, where the situation is so steep and mountainous, that the staves cannot be placed at equal distances from the instrument, or where it is even impossible to make a reciprocal levelling from one station to the other. Thus suppose the point K to be the bottom of a bason where it is required to make a fountain, the reservoir being at A; so that, in order to know the height to which the jet d'eau will rise, it is necessary to know how high the point A is above K.

In great heights such as this, it will be necessary to proceed by small descents, as from A to D. The instrument must be adjusted with all possible care; and it will even be proper, in some part of the work, to use a smaller instrument. The following is a table of the different operations used in making this level, it having been taken from M. le Febure's practice.

	feet.	in.		feet.	in.	yds.
A	21	6	C	0	9	90
C	4	3	D	0	3	40
D	3	9	E	16	3	350
E	5	0	F	17	9	250
F	10	6	G	5	0	375
G	5	0	H	19	0	300
H	5	0	K	47	3	1000
	95	0		106	9	2405

In this case only two levellings are made between A and D, though more would have been necessary; but they are omitted to avoid confusion. In the fourth station the height found was 16 feet 8 inches; but on account of the great length, it was requisite to reduce the apparent level to the true one, which is always necessary where the length is considerable. At the last limit we get the height from N to *o*; then from *o* to I; from I to K, fig. 7. &c.; all which added together, and then corrected for the curvature, gives 47 feet 3 inches. Now, by adding each column together, and subtracting one from the other, we have 51 feet 9 inches for the height which the point A is above the bottom of the bason, and which will cause the jet d'eau to rise about 45 feet. The general section of this operation is shown at fig. 7, 8. but an exact profile of the mountain is more difficult, as requiring many operations; though some of these might be obtained by measuring from the level line without moving the instrument.

The last example given by Mr. Adams is likewise from M. le Febure, and includes a length of near five German miles (25 of ours) in a straight line, and 9 or 10 (45 or 50 English) including the turnings and windings. In this the declivity of the river Haynox was measured from Lignebruk to Villebourg. The first operation was to drive stakes at several parts of the

river even with the water's edge; the first of which a little above the mills of Lignebruk showed the upper water-mark, and another showed the lower water-mark at the same mills. Two stakes above and below the mills of Mazurance, somewhat more than half way between Lignebruk and Villebourg, pointed out the difference between high and low water there, and formed likewise the third and fourth limits of the operation; while the stakes above and below the mills of Villebourg pointed out the difference between high and low water, and likewise formed the last limits of the operation.

These marks were all made at the edge of the water, exactly even with its surface, and all made at the different parts of the river nearly at the same instant of time. "The principal limits of the levelling (says Mr. Adams) being now determined and fixed, it only remains to find the level between the limits, according to the methods already pointed out, using every advantage that may contribute to the success of the work, and at the same time avoiding all obstacles and difficulties that may retard or injure the operations. The first rule is always to take the shortest possible way from one limit to another, though this rule ought not to be followed if there are considerable obstacles in the way, as hills, woods, marshy ground, or if, by going aside, any advantage can be obtained." In the present case it was found necessary to deviate very considerably from the general rule, in order to take in several ponds, the surfaces of which might have all been taken for a perfect level; and thus levels were frequently taken across the country for a considerable way. The difference of height between the mills of Lignebruk and Villebourg was at last found to be about 19 feet, indicating a descent of not quite a foot in a mile.

Levelling-staves, instruments used in levelling, serving to carry the marks to be observed, and at the same time to measure the height of those marks from the ground. They usually consist of two mahogany staves ten feet long, in two parts, that slide upon one another to about $5\frac{1}{3}$ feet, for the more portable carriage. They are divided into 1000 equal parts, and numbered at every tenth division, by 10, 20, 30, &c. to 1000; and on one side the feet and inches are also sometimes marked. A vane slides up and down upon each set of these staves, which by brass springs will stand at any part. These vanes are about 10 inches long and 4 inches broad; the breadth is first divided into three equal parts, the two extremes are painted white, the middle space divided again into three equal parts, which are less; the middle one of them is also painted white, and the two other parts black; and thus they are suited to all the common distances. These vanes have each a brass wire across a small square hole in the center, which serve to point out the height correctly, by coinciding with the horizontal wire of the telescope of the level.

For the method of levelling by means of the barometer and thermometer, see Barometer.

LE'VELNESS. *s.* (from *level.*) 1. Evenness; equality of surface. 2. Equality with something else (*Peacham*).

LE'VEN. *s.* (*levain*, French.) 1. Ferment; that which being mixed in bread makes it rise and ferment. 2. Any thing capable of changing the nature of a greater mass (*Wiseman*).

Leven, a river of Dumbartonshire, in Scotland, which issues from Loch Lomond.

Leven (Loch), a beautiful lake in Kinross-shire, twelve miles in circumference, and somewhat of a circular form. It has several small islands, on one of which is a ruinous castle. Here the unfortunate Mary, queen of Scots, was confined by the confederate lords, after the murder of her husband lord Darnley, and her marriage with Bothwell; but she escaped in 1568 by the assistance of the brother of the governor of the castle. Another island, named St. Serf's Isle, is said to have been a residence of the Pictish priests: it was afterwards the seat of a priory, of which some remains are to be seen. This lake produces trout of a peculiar excellence; of which great quantities, at certain seasons, are sent to the Edinburgh markets. In autumn, a singular species, called the gully trout, is here salted and dried for winter provision.

LEVER, a straight bar of iron or wood, &c. supposed to be inflexible, supported on a fulcrum or prop by a single point, about which all the parts are moveable.

The lever is the first of those simple machines called mechanical powers, as being the simplest of them all; and is chiefly used for raising great weights to small heights.

The lever is of three kinds. First the common sort, where the weight intended to be raised is at one end of it, our strength or another weight called the power is at the other end, and the prop or fulcrum is between them both. In stirring up the fire with a poker, we make use of this lever; the poker is the lever, it rests upon one of the bars of the grate as a prop, the incumbent fire is the weight to be overcome, and the pressure of the hand on the other end is the force or power. In this, as in all the other machines. we have only to increase the distance between the force and the prop, or to decrease the distance between the weight and the prop, to give the operator the greater power or effect. To this kind of lever may also be referred all scissars, pincers, snuffers, &c. The steel-yard and the common balance are also levers of this kind.

In the lever of the second kind the prop is at one end, the force or power at the other, and the weight to be raised is between them. Thus, in raising a water-plug in the streets, the workman puts his iron bar or lever through the ring or hole of the plug, till the end of it reaches the ground on the other side; then making that the prop, he lifts the plug with his force or strength at the other end of the lever. In this lever too, the nearer the weight is to the prop, or the farther the power from the prop, the greater is the effect. To this second kind of lever may also be referred the oars and rudder of a boat, the masts of a

ship, cutting knives fixed at one end, and doors whose hinges serve as a fulcrum.

In the lever of the third kind, the power acts between the weight and the prop; such as a ladder raised by a man somewhere between the two ends, to rear it against a wall, or a pair of tongs, &c.

It is by this kind of lever too that the muscular motions of animals are performed, the muscles being inserted much nearer to the centre of motion, than the point where is placed the centre of gravity of the weight to be raised; so that the power of the muscle is many times greater than the weight it is able to sustain. And in this third kind of lever, to produce a balance between the power and weight, the power or force must exceed the weight, in the same proportion as it is nearer the prop than the weight is; whereas in the other two kinds, the power is less than the weight, in the same proportion as its distance is greater; that is, universally, the power and weight are each of them reciprocally as their distance from the prop; as is demonstrated below.

Some authors make a fourth sort of what is called a bended lever; such as a hammer in drawing a nail, &c.

In all levers, the universal property is, that the effect of either the weight or the power, to turn the lever about the fulcrum, is directly as its intensity and its distance from the prop; whence it is deduced that if parallel forces acting perpendicularly upon a straight lever keep it in equilibrio, they will be to each other reciprocally, as the distances from the fulcrum at which they act.

As the fundamental property of the lever is one of the principal ones lying at the basis of mechanical science, we shall extract from the "Retrospect of Philosophical Discoveries" a brief sketch of some of the chief demonstrations that have been published, with the leading objections that have been urged against them.

The first we believe who attempted it, at least whose demonstration has been handed down to us, was Archimedes. His demonstration is founded upon the supposition, that if a number of equal weights or bodies be suspended from the arms of a lever, at equal distances from each other, their tendency to cause the lever to turn about its fulcrum will be the same as it would be if they were all united, and suspended from a point which is situated in the middle between all the points of suspension, and considered as the common centre of gravity of all the bodies. This supposition, however, is by no means self-evident, and therefore the investigation founded upon it has been rejected by succeeding mathematicians as imperfect.

The next demonstration of this general property, in point of time, was that given by Galileo, in his second dialogue on the resistance of solids. This demonstration for the straight lever is more simple and obvious than that of Archimedes, but as it depends upon the noted theorem concerning the common centre of gravity of two bodies, which itself needed demonstration, as it was only inferred from the general property of the lever, it was not without its objectors.

Mr. Huygens, in his Miscellaneous Observations on Mechanics, observes, that some mathematicians have endeavoured, by changing the form of Archimedes's demonstration, to render its defect less sensible, but without success. He then proposes one of his own, in which he takes for granted that, when two equal bodies are suspended from the arms of a lever, that which is furthest from the fulcrum will have the greater effect in causing the lever to turn on its fulcrum. To this it has been objected, that it is resting the demonstration upon a fact that is to be proved by it; and even independent of this irregularity, on which we should not lay much stress, his demonstration is very tedious and prolix, and holds only when the arms of the lever are commensurable.

Maclaurin's demonstration, given in his Account of Newton's Philosophy, is also considered as imperfect; as he has inferred the truth of this general property from an inductive process, and has not extended it to the case where the arms of a lever are incommensurable.

The demonstration given by Mr. Landen, in his Memoirs, appears to be founded upon self-evident principles, and his reasoning upon them correct; but as the investigation is long and tedious, and includes several cases, it has been regarded as wanting a sufficient degree of simplicity to render it proper for an elementary treatise of mechanics.

Dr. Hamilton, in his Essays, after objecting to Newton's demonstration, as well as to several of those noticed above, proposes to supply the defects he had pointed out, by a demonstration of his own; which, however, depends upon this proposition, that when a body is kept in equilibrio by the action of three forces, they will be to each other as the three sides of a triangle parallel to their respective directions. With respect to this proposition, Mr. Vince, in the Philosophical Transactions for 1794, observes, "Now this is true, when the three forces act at any point of a body; whereas, considering the lever as the body, the three forces act at different points, and therefore, the principle, as applied by the author, is certainly not applicable. If in this demonstration we suppose a plain body, in which the three forces act, instead of simply a lever, then, the three forces being actually directed to the same point of the body, the body would be at rest. But in reasoning from this to the case of the lever, the same difficulties would arise, as in the proof of Sir I. Newton. But admitting that all other objections could be removed, the demonstration fails when any two of the forces are parallel. Another demonstration is founded upon this principle, that if two non-elastic bodies meet with equal quantities of motion, they will, after impact, continue at rest; and hence it is concluded, that if a lever which is in equilibrio be put in motion, the motions of the two bodies must be equal; and therefore the pressures of these bodies upon the lever at rest, to put it in motion, must be as their motions. Now this is comparing the effects of pressure and motion, the relation of the measures of which, or whether they admit of any relation, we are totally unacquainted with." Mr. Vince then proceeds to complete the demonstration of Archimedes, by proving the principles upon which it depends. However, we do not think that this demonstration yet possesses that high degree of clearness and simplicity which the learned professor seems to attribute to it.

Dr. Hutton, in his truly excellent Mathematical Dictionary, article LEVER, observes, that writers on mechanics commonly demonstrate the general property of the lever in a very absurd manner, viz. by supposing the contrary: that is,

Fig. 1.

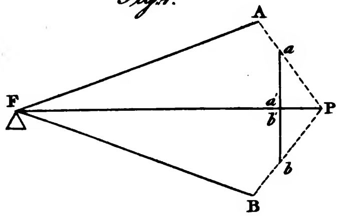


Fig. 2.

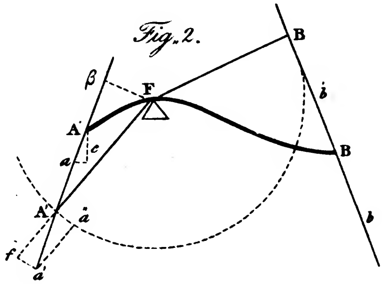


Fig. 3.

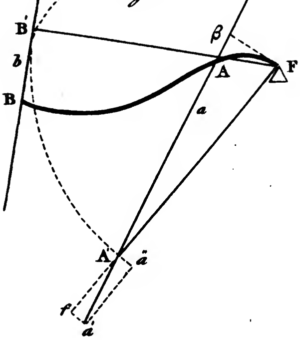


Fig. 4.

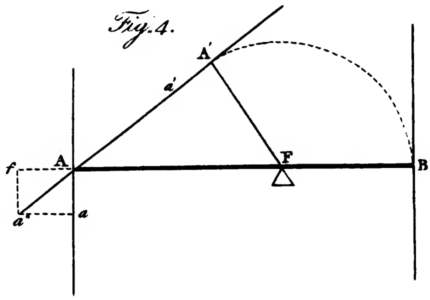


Fig. 5.

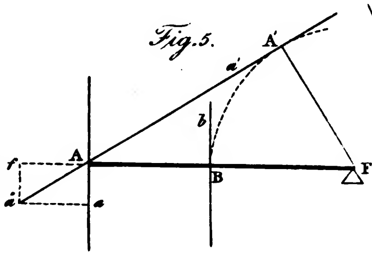


Fig. 6.

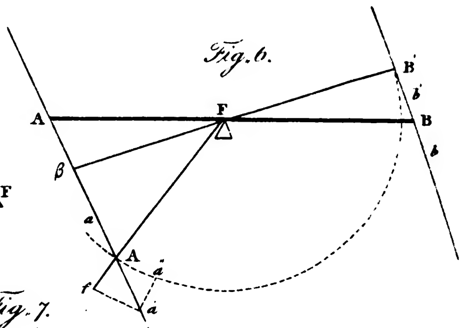
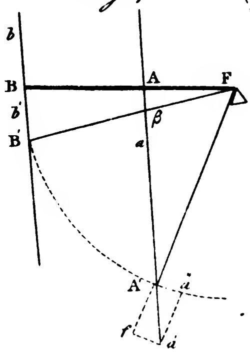


Fig. 7.



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they demonstrate that a body is at rest by supposing it to be in motion. He then adds, "I shall therefore give here a new and universal demonstration of the property, on the pure principles of rest and pressure, or force only." This new demonstration, however, is essentially the same in principle as Dr. Hamilton's (a circumstance with which we doubt not Dr. Hutton was unacquainted); and is, therefore, liable to the same objections.

D'Alembert, Prony, and Fonsenex, have likewise given demonstrations; but they cannot be regarded as free from objections, though we have not room to dilate upon them here.

For our own parts we have long been of opinion, that the demonstration of our illustrious countryman, sir Isaac Newton, is more simple, more obvious, and more satisfactory, than any other with which we are acqainted; we shall therefore here adopt from No. 82 of the Repertory of Arts and Manufactures an Essay by Dr. Gregory, in which he presents Newton's demonstration in a shape rather different from that in which it was first exhibited in the Principia, and indeed from any in which it has been heretofore represented, that he may more readily show its application to the case of parallel forces acting on a straight lever (an application which it has been supposed it would not admit, except by a bare induction) and more easily defend it against the most plausible objections.

"Besides the knowledge of the celebrated theorem, of the parallelogram of forces and of statical composition and resolution, the demonstration of Newton requires the admission of only two principles, which may be stated in the form of lemmata, thus:

"LEMMA 1. *In every system of an invariable form we may suppose powers or forces to be applied, without changing the effects, at any points whatever in the lines of their directions.*

"This proposition is so evident as to be adopted without either proof or illustration, by many writers on the theory of mechanics. Indeed, it must be very manifest that (admitting the convenience of application in all to be alike), if any body be acted upon by a force pushing against it by means of an inflexible bar, the effect will be the same upon the body at whatever point of the bar the force be exerted, the directions of the bar and of the force coinciding: and when the body is acted upon by a force drawing by a straight inextensible cord, the effect will be the same at whatever part of the cord the soliciting force acts: it being supposed in either case that the force is not employed in part in supporting the bar or cord. For, in the first case, at whatever point of the bar the thrusting force F acts, an equal and contrary force F' will destroy its effect; and in the second, at whatever point of the cord the pulling force φ acts, an equal and opposite force φ' will annihilate its effect.

"LEMMA 2. *Equal and contrary forces acting perpendicularly at the extremities of two equal arms of an angular lever (or two equal radii of a wheel), will prevent it from turning upon its fulcrum or centre of motion.*

"This is a legitimate deduction from the doctrine of moments, in which it is affirmed that the sum of the moments of forces which tend to produce rotation in one direction, is equal to the sum of the moments of forces which tend to produce rotation in a contrary direction, when the forces are in equilibrio. For the forces being equal, and the perpendicular distances of their directions from the fixed point being equal also, their products, that is to say, the moments, are equal likewise, and the equilibrium obtains.

"The truth of this may be made to flow from the proposition that the effects of forces, when estimated in given directions, are not altered by composition or resolution. Thus let FA, FB (Fig. 1. Pl. 96.) be the equal arms at the extremities A and B, of which the equal forces act in the contrary directions AP, BP, each tending to produce rotation about F as a centre: since, by the first lemma, the forces may be supposed to act at any points in their respective lines of direction, let them be conceived to act simultaneously at P, the point of concourse of the directions; and let the effects of these forces be both estimated in the direction FP. Let the equal distances aP, bP, in the directions of the two forces represent the magnitudes of those forces estimated in their respective directions; then will aP cos. APF$=a'$P, the reduced force aP, in the assumed direction FP, and bP cos. BPF$=$Pb' the contrary force reduced to the same direction. But the triangles FAP, FBP, right angled at A and B, having the sides FA, FB, equal, and FP, common, are equal in all respects; consequently FPA$=$FPB, and aP cos. FPA$=b$P cos. FPB, or a'P$=$Pb'. Hence it follows that the two forces represented by aP, bP, produce an equilibrium in the assumed direction FP; and therefore, that the contrary equal forces acting at the extremities of the equal arms FA, FB, are in equilibrio; since it is a well known corollary of what has been stated at the commencement of this paragraph, that, if a system of equilibrated forces in one direction be reduced to any other, the forces will still be in equilibrio.

"In fact, it is only to satisfy the more scrupulous, that this lemma has been so long dwelt upon. Most students of the science of mechanics would be satisfied of its truth as soon as they saw that no reason could be assigned why one force should prevail over the other. Or we might say, nearly in the language of Mr. professor Vince, when explaining the demonstration originally given by Archimedes, the lemma rests 'upon the most self-evident principles,' which are, that 'equal forces acting similarly at equal distances, must produce equal effects; which is manifest from this consideration, that when all the circumstances in the cause are equal, the effects must be equal;' and equal mechanical effects produced in contrary senses must destroy each other's operation.

"The truth of the preceding lemmata being admitted, as I conceive they will generally be, without any hesitation, I proceed to exhibit and apply the demonstration of Newton, to the instances of bent and of straight levers (considered as divested of heaviness) in three propositions.

"PROP. I. *Any two forces acting upon a bent lever in different directions, but in the same plane, will be in equilibrio, if they are to each other reciprocally as the perpendiculars let fall from the fulcrum upon their directions.*

"CASE I. *When the forces act on different sides of the fulcrum.*

"Let the bent lever AFB (Fig. 2, Plate 96.) whose fulcrum is F, be conceived to form part of a plane ungravitating wheel, capable of being moved about F as a centre of motion: and let it be proposed to determine the ratio of two forces P, Q, acting at the extremities AB of the lever, in the directions Aβ, BB', and keeping the system in equilibrio. Upon BB' the direction of one of the forces demit from F the perpendicular FB',

and from centre F with the radius FB′ describe an arc intersecting the direction $A\beta$ of the force P in the point A′: then, drawing the line FA′ we may conceive FA′, FB′, to be equal radii of the plane ungravitating wheel, and, from the relation of the forces which secure the equilibrium when acting at A′ and B′, may deduce the relation of the forces P and Q: for it is manifest, from the 2d lemma, that equal and contrary forces acting at the points A′, B′, in the tangential directions $A'a''$, $B'b''$, will annihilate each other's effects; while, from the first lemma it follows, that a force acting in the direction $A'\beta$, will have the same effect at A′ as at A, and another force acting in the direction BB′ will have the same effect at B′ as at B. Let the force P be represented by Aa, and the force Q by Bb; make $A'a' = Aa$, and $B'b' = Bb$; and, producing the line FA′, complete the parallelogram of forces $f\,a''$. Now, the force $A'a'$ (keeping $B'b'$ in equilibrio) being decomposed into the two, $A'f$ in the direction FA, and $A'a''$ perpendicular to it, the latter only will have a tendency to produce rotation, or to disturb an equilibrium, the former being absorbed by the reaction of the fixed point F. But, by the second lemma, the force $A'a''$ is equal to $B'b'$, that is to Q, in the case of equilibrium: therefore, $P : Q :: A'a' : A'a''$. Also, the similar triangles $A'a'a''$, $A'F\beta$, give $A'a' : A'a'' :: A'F : (=FB') : F\beta$; consequently (by equality,) $P : Q :: FB : F\beta$, or $\frac{P}{Q} = \frac{FB'}{F\beta}$; that is, the forces are reciprocally as the perpendiculars let fall from the fulcrum upon their respective directions. Q. E. D.

"Case 2. *When both the forces act on the same side of the fulcrum.*

"In this case, referring to Fig. 3, instead of Fig. 2, the same letters being put to the corresponding parts in both, the reasoning will apply throughout, and the same conclusion will result: and, as the division of the subsequent propositions into two cases will be attended with similar circumstances, there will be no occasion to make this division formally, but merely to adapt two figures to each demonstration.

"Prop. II. *If parallel forces, acting perpendicularly upon a straight lever, keep it in equilibrio, they will be to each other reciprocally, as the distances from the fulcrum at which they act.*

"Here the same general supposition being allowed as at the commencement of the demonstration of the preceding proposition, let us suppose that the force Q measured by Bb in its own direction, is first balanced (lemma 2.) by the equal force $A'a'$ (Fig. 4 and 5. Plate X.) acting perpendicularly at the extremity of the arm $FA' = FB$, the direction $A'a'$ produced meeting the straight lever in the point A: then, making $Aa'' = A'a'$, the force Aa'' acting at A, will have the same efficacy (lemma 1.) in turning the system about F, as the force $A'a'$, acting at the point A′; it will therefore be in equilibrio with the force $Bb = Q$ acting at B. Resolving the force Aa'' into the two Af, Aa, the former has evidently no tendency to produce rotation about the fixed point F, the latter therefore (Aa) must maintain the equilibrium with the force Q acting at B, and will consequently be the measure of the force P. Now the similar triangles $a''Aa$, AFA' give $Aa : Aa'' :: FA' : FA$. But $Aa = P$, $Aa'' = Bb = Q$, and $FA' = FB$: so that the preceding analogy becomes $P : Q :: FB' : FA$, or $\frac{P}{Q} = \frac{FB'}{FA}$; that is, the forces are to each other reciprocally, as the distances from the fulcrum at which they act. Q. E. D.

"Prop. III. *Any parallel forces acting upon a straight lever, will keep it in equilibrio, if those forces be to each other reciprocally as the distance from the fulcrum, measured on the lever, at which they act.*

"Let AFB or BAF (Fig. 6 and 7, Plate X.) be the lever, F the fulcrum, and AA′ B′B, the parallel directions in which the forces P and Q act, those directions being here supposed not perpendicular to the lever: then drawing the several lines as in the diagrams, the reasoning used in the demonstration of the first proposition will apply here throughout, the same letters being placed against the corresponding parts of figures, 2, 3, 6, and 7. Following then the steps of that demonstration, it will be seen (in figures 6 and 7.) that $P : Q :: FB' : F\beta$: wherefore, since the similar triangles FBB', $FA\beta$, give $FB' : F\beta :: FB : FA$, we shall have $P : Q :: FB : FA$, or $\frac{P}{Q} = \frac{FB}{FA}$, whence the truth of this proposition likewise is manifest.

"As to the objections which have been urged by different mathematicians against Newton's demonstration of the property of the lever, they may be reduced to three principal ones, all of which will, I hope, be thought of little weight, when the preceding lemmata and propositions are duly considered.

"1st. It has been objected that the principle of equal forces acting perpendicularly at the extremities of equal arms, producing an equilibrium when they act in contrary directions, can by no means be admitted, since 'we are supposed to be totally ignorant of the effects of weights or of forces upon any lever.'

"To this it may be replied, that when, in the theory of mechanics, we attempt to investigate the properties of levers, there is no occasion to pre-suppose that we undertake this while we 'are totally ignorant of the effects of weights or of forces upon any lever:' on the contrary, it may be fairly imagined that, previously to undertaking this inquiry, it has been ascertained, either by experiment or from reasoning, that equal forces acting similarly, though in contrary senses, upon equal arms of any lever, produce an equilibrium; and farther, that when equal forces act on the arms of a lever, that which is farthest from the fulcrum will prevail; for it is only some such preparatory knowledge that would in general induce a theorist to enquire what is the universal invariable law or relation which subsists between forces or weights acting upon a lever at any distances, or in any directions. Besides, every theorist must be supposed to come to this investigation prepared to acknowledge the truth of the second lemma, since he must have a previous acquaintance with the usual theorems relative to the composition and resolution of forces; and ought to be aware that the theorems are very confined in their utility whilst they are restricted to forces acting stimulantly upon a physical point; but that then only can they be of much essential service in the science of mechanics, when it has been shown, that if several forces acting at once upon different points of a body keep it in equilibrio, they are such as would balance when all act at one point, their directions continuing respec-

tively parallel; because by that extension the theory may be applied to levers of any shape (as well as to other bodies) either supposing such levers to be divested of heaviness, or supposing the force of gravity to be one of those employed in the equilibrated system. And this remark will suggest an answer to most of the minor objections.

"2dly. It has been objected, by Dr. Hamilton, that Newton's demonstration, though confessedly simple, 'depends on this supposition, that, when from the fulcrum of a lever several arms or radii issue out in different directions, all lying in the same vertical plane, a given weight will have the same power to turn the lever, from which ever arm it hangs, provided the distance of its line of direction from the fulcrum remains the seme. Now, (the doctor observes) it must appear difficult to admit this supposition when we consider that the weight can exert its whole force to turn the lever only on that arm which is the shortest and is parallel to the horizon, and on which it acts perpendicularly, and that the forces which it exerts, or with which it acts perpendicularly, on any one of the oblique arms, must be inversely as the length of that arm, which is evident from the resolution of forces.'

"Now, if the consideration of forces in general be substituted for that of weights, which will no way affect the principle of Newton's demonstration, we shall thus get quit of the inadequate conceptions resulting from confining the attention to one kind of force only, and prepare the mind for the ready admission of our first lemma, which, in fact, removes this objection. Indeed it is not a little curious that Dr. Hamilton's own reasoning seems to contain a reply to the objection he advances: for it may easily be shewn that the equal forces Aa, $A'a'$, for example, (Fig. 2.) acting in the same directions upon the extremities A and A′ of the arms FA, FA′, are inversely as these arms when estimated in directions perpendicular to them, and consequently, that each has the same tendency to produce rotation about the centre F. Thus Aa being equal to $A'a'$, and the triangles Aae, $A'a'a''$, right-angled at e and a'', we have $Ae : A'a'' :: \sin. a : \sin. a'$. But FA and ea being parallel, we have $FAa = 180^\circ - a$, and consequently $\sin. a' = \sin. FAA'$: while $\sin. a' = \sin. AA'F$, the line Aa' cutting the two parallels FA′, $a''a'$: hence, it follows that $Ae : A'a'' :: \sin. FAA' : \sin. AA'F$. Now in the triangle FAA′, we have $FA' : FA :: \sin. FAA' : AA'F$; whence, by equality, $Ae : A'a'' :: FA' : FA$; or, by making equal the products of the mean and extreme terms, there results $FA . Ae = FA' A' a''$; these equal rectangles being the obvious measures of equal tendencies to produce rotation.

"3dly. It has been objected to Newton's demonstration that it wants universality, being inapplicable to the case of parallel forces acting upon a straight lever: this objection is removed by the second and third of the foregoing propositions.

"I might now restore the consideration of gravity (which has been hitherto excluded in the investigations) to the several bars issuing from the centre of the wheel; and show with what facility the preceding principles, combined with the known properties of the centre of gravity would contribute to the establishment of the various theorems appertaining to the different kinds of heavy levers, the pressure on their fulcrums, &c: but this would draw us too far from the professed objects of this paper, which were to defend the principles adopted by Newton from objections, and to shew that they apply to straight as well as to bent levers, contemplating both merely as inflexible bars divested of heaviness: such being the point of view in which they were considered by our illustrious philosopher in his Principia and in which they are commonly considered in treatises of mechanics. If I shall have been so fortunate as to evince the preference of Newton's demonstration to any of the others mentioned in the beginning of this communication, and to show that it may be accommodated to the case of straight levers, so as to furnish a proof more simple and natural than either that of Archimedes or of Galileo; I shall please myself with the reflection that this essay may be of some utility to those who are engaged in either the cultivation or promotion of an important branch of science." (*Rep. of Arts*, &c. No. 82.)

LEVERET, in the sportsman's vocabulary, a hare during its first year, or while rising to its full growth.

LEVERPOOL See LIVERPOOL.

LEVE'T. *s.* (from *lever*, French.) A blast on the trumpet (*Hudibras*).

LE'VEROOK. *s.* (laꝼeꞃe, Saxon.) This word is retained in Scotland, and denotes the lark (*Walton*).

LE'VIABLE. *a* (from *levy*.) That may be levied (*Bacon*).

LEVI'ATHAN. *s.* (לויתן) A water animal mentioned in the book of Job. By some imagined the crocodile, by others the whale. But the probability is that the description applies to some animal now extinct. See LACERTA CROCODILUS.

To LE'VIGATE. *v. a.* (*lævigo*, Latin.) 1. To rub or grind to an impalpable powder. 2. To mix till the liquor becomes smooth and uniform (*Arbuthnot*).

LEVIGA'TION. *s.* (from *levigate*.) The reducing of hard bodies into a subtile powder, by grinding upon marble with a muller. See PHARMACY.

LEVI'STICUM. (*levisticum*, from *levo*, to assuage; so called from the relief it gives in painful flatulencies). Lovage. The odour of this plant, ligustrum levisticum of Linnéus, (ligustrum foliis multiplicibus, foliolis superne incisis. Class pentandria. Order digynia), is very strong and particularly ungrateful; its taste is warm and aromatic. It abounds with a yellowish gummy resinous juice, very much resembling opoponax. Its virtues are supposed to be similar to those of angelica and masterwort in expelling flatulencies, exciting sweat, and opening obstructions; whence it is chiefly used in hysterical disorders and uterine obstructions. The leaves eaten in salad are accounted emmenagogue. The root, which is less ungrateful than the leaves, is said to possess similar virtues, and may be employed in powder.

LEVITE, in a general sense, means all the descendants of Levi, among whom were the Jewish priests themselves, who, being descended from Aaron, were likewise of the race of Levi. In a more particular sense, Levite is used for an order of officers in that church, who were employed in performing the manual service of the temple. They were obedient to the priests in their ministration, and brought them wood, water, and other necessaries for the sacrifice.—They sung and played upon instru-

ments in the temple and in other places. They applied themselves to the study of the law, and were the ordinary judges of the country, but always subordinate to the priests. Their subsistence was the tythes of corn, fruit, and cattle, throughout Israel; but the priests were entitled to a tenth of their tythes, by way of first-fruits to the Lord. Eight-and-forty cities were assigned for the residence of the Levites, of which the priests claimed thirteen, six whereof were chosen for cities of refuge. They were consecrated before they entered upon their ministry, by shaving their flesh, washing their clothes, and sprinkling with the water of expiation.

LEVI'TICAL. *a.* (from *levite.*) Belonging to the Levites; making part of the religion of the Jews (*Ayliffe*).

LEVITICUS, a canonical book of the Old Testament, being the third of the Pentateuch of Moses: thus called, because it contains principally the laws and regulations relating to the priests, the Levites, and sacrifices; for which reason the Hebrews call it the priests' law.

LE'VITY. *s.* (*levitas*, Latin.) 1. Lightness; not heaviness (*Bent.*). 2. Inconstancy; changeableness (*Hooker*). 3. Unsteadiness; laxity of mind (*Mil.*). 4. Idle pleasure; vanity (*Calamy*). 5. Trifling gayety; want of seriousness (*Att.*).

LEUK, a town of Swisserland, in the Valais, situated about a quarter of a league from the Rhone; the principal place of a dixain: behind it is a lofty mountain, and on the sides are two brooks, which run into deep beds. It contains two churches, and a large palace of the bishops of Sion. Two leagues to the north are some celebrated baths, said to be beneficial in rheumatisms, diseases of the skin, &c.: twenty miles E. Sion.

LEUSDEN (John), a celebrated philologer, born in 1624. He studied the learned languages and mathematics at Utrecht; and then went to Amsterdam, to converse with the rabbis, and perfect himself in the Hebrew tongue. After which he was professor of Hebrew at Utrecht, where he acquired a great reputation, and died in 1699. He wrote many valuable works; the principal of which are, 1. Onomasticum Sacrum, 8vo. 2. Clavis Hebraica & Philologica Veteris Testamenti, 4to. 3. Novi Testamenti Clavis Græca, cum Annotationibus Philologicis, 8vo. 4. Compendium Biblicum Veteris Testamenti, 8vo. 5. Compendium Græcum Novi Testamenti; the best edition of which is that of London, in 1668, 12mo. 6. Philologus Hebræus, 4to. 7. Philologus Hebræo mixtus, 4to. 8. Philologus Hebræo-Græcus, 4to. 9. Notes on Jonas, Joel, Hosea, &c. He also gave correct editions of several learned works.

LEUTKIRK, a free imperial town of Suabia, seated on a rivulet that falls into the Iller, 22 miles N.E. of Lindau. Lon. 10. 12 E. Lat. 47. 53 N.

LEUTMERITZ, a town of Bohemia, capital of a circle of the same name, with a bishop's see. It is seated on the Elbe, 30 miles N.W. of Prague, and 40 S.E. of Dresden. Lon. 14. 31 E. Lat. 50. 30 N.

LEUTMUHL, a town of Bohemia, in the circle of Chrudim, erected into a bishopric in 1144, but the town having suffered greatly by the Hussites, the bishopric was suppressed. It is 22 miles E. of Chrudim, and 76 E. of Prague.

LEUWENHOEK (Antony), a celebrated Dutch philosopher, was born at Delft in 1632, and acquired a great reputation throughout all Europe, by his experiments and discoveries in Natural History, by means of the microscope. He particularly excelled in making glasses for microscopes and spectacles; and he was a member of most of the literary societies of Europe, to whom he sent many memoirs. Those in the Philosophical Transactions, and in the Paris Memoirs, extend through many volumes; the former were extracted, and published at Leyden, in 1722. He died in 1723, at 91 years of age.

To LE'VY. *v. a.* (*lever*, French.) 1. To raise; to bring together men (*Davies*). 2. To raise money (*Clarendon*). 3. To raise war (*Mil.*).

LE'VY. *s.* (from the verb.) 1. The act of raising money or men (*Addison*). 2. War raised (*Shakspeare*).

LEWARDEN, a populous and strong town of the United Provinces, capital of Friesland. The buildings, as well public as private, are magnificent. It has several canals in the streets, which are a great assistance to its trade; especially as they are continued not only to the sea, but to the most considerable towns in the province. It is 27 miles W. of Groningen, and 65 N. by E. of Amsterdam. Lon. 5. 32 E. Lat. 53. 11 N.

LEWD. *a.* (læpede, Saxon.) 1. Lay; not clerical: obsolete (*Davies*). 2. Wicked; bad; dissolute (*Whitgift*). 3. Lustful; libidinous (*Shakspeare*).

LE'WDLY. *ad.* (from *lewd.*) 1. Wickedly; naughtily (*Shak.*). 2. Libidinously; lustfully (*Dryden*).

LE'WDNESS. *s.* (from *lewd.*) Lustful licentiousness (*Dryden*).

LE'WDSTER. *s.* (from *lewd.*) A lecher; one given to criminal pleasures (*Shakspeare*).

LEWENSTEIN, a town of Franconia, capital of a county of the same name, with a fortress, 10 miles E. of Hailbron, and 30 N.N.E. of Stutgard. Lon. 9. 38 E. Lat. 49. 18 N.

LEWENTZ, a town of Upper Hungary, in the county of Gran, and on a river of the same name, where the Turks were defeated in 1644. It is 25 miles N.E. of Gran. Lon. 18. 31 E. Lat. 48. 21 N.

LEWES, a borough in Sussex, with a market on Saturday. It contains six parish churches, and is seated on the Ouse, which is navigable here for barges. The assizes are sometimes held here; and it sends two members to parliament. Near this town was fought a battle in 1263, when Henry III. and his son prince Edward (afterward Edward I.) were made prisoners by the earl of Leicester. Lewes is situated at the edge of the South Downs, on the declivity of a hill, on which are the remains of an ancient castle. It is 30 miles E. of Chichester, and 49 S. of London. Lon. 0. 5 E. Lat. 50. 55 N.

LEWIS, one of the most considerable of the Western Islands of Scotland, which being connected by a narrow isthmus with Harris, forms but one island, which is about 60 miles in length, and of considerable breadth toward the middle and north end. It is greatly intersected by arms of the sea, by which it may be said to be divided into five peninsulas. The country, in general, is wild, bleak, barren of wood, and little fitted for cultivation: the hills are covered with heath, which affords shelter for various sorts of game. The lakes and streams abound with salmon, large red trout, &c. and there are good fisheries on the coast, which is annually visited by millions of herrings. So immense are the shoals of dog-fish which pursue the herrings, that their dorsal fins are sometimes seen like a thick bush of sedges above the water. Stornaway is the only town in Lewis. This island belongs to Rossshire. There are several inferior isles and rocks comprehended under Invernessshire. The whole lies 20 miles N.W. of the isle of Skye.

LEWISBURGH, a town of Northumberland county, in Pennsylvania, seated on the Susquehannah, 140 miles N.W. of Philadelphia.

LEWISTOWN, the county-town of Mifflin, in Pennsylvania, seated on the Juniatta, 150 miles W.N.W. of Philadelphia. Lon. 78. 13 W. Lat. 40. 35 N.

LEWISHAM, a village in Kent, on the river Ravensbourn, five miles S.E. of London. The church is an elegant new edifice.

LEX, law. See Law.

LEXICO'GRAPHER. *s.* (λεξικον and γραφω.) A writer of dictionaries; a harmless drudge, that busies himself in tracing the orginal, and detailing the signification of words (*Watts*).

LEXICO'GRAPHY. *s.* (λεξικον and γραφω.) The art or practice of writing dictionaries.

LEXICON (λεξικον) the same with dictionary. The word is chiefly used in speaking of Greek dictionaries: it is derived from the Greek word λεξις, diction; of λεγω, I speak. Thus we have Hederic's, Scapula's, Parkhurst's Lexicon, &c. See Dictionary and Encyclopædia.

LEXINGTON, the capital of the state of Kentucky, and county of Fayette. Near this town are to be seen curious sepulchres, full of human skeletons, which were thus fabricated: first on the ground were laid large broad stones; on these were placed the bodies, separated from each other by broad stones, covered with others, which served as a basis for the next arrangement of bodies. In this order they are built, without mortar, growing still narrower to the height of a man. This method of burying appears to be totally different from that now practised by the Indians. In the neighbourhood also are remains of two ancient fortifications, with ditches and bastions; one containing about six acres of land, and the other nearly three. Pieces of earthen vessels have also been ploughed up near Lexington; a manufacture with which the Indians were never acquainted. These, with the fortifications, and the sepulchres, have been urged as an argument, that this country was formerly inhabited by a people different from the present Indians, and further advanced than they in the arts of life; and Mr. Filson, in his account of this country, has advanced arguments to prove that these people were, in all probability, an ancient colony from Wales. Lexington stands at the head of the river Elkhorn, 470 miles W. of Washington. Lon. 85. 10 W. Lat. 38. 20 N.

Lexington, a town of the state of Massachusets, celebrated for being the place where hostilities commenced between the British troops and the Americans, in April, 1775. It is 12 miles N.W. of Boston.

LEXIPHARMICS. (from ληγω, to terminate, and φαρμακον, poison.) Antidotes: alexipharmics: medicines which resist or destroy the power of poison.

LEXIPYRETICS. (from ληγω, to terminate, and πυρετος, a fever.) Febrifuges: medicines that destroy or shorten the duration of fevers.

LEY. *s.* *Ley*, *lee*, *lay*, are all from the Saxon leag, a field or pasture (*Gibson*).

LEYDEN, a city of the United Provinces, in Holland, now called the kingdom of Holland, four miles and a half in circumference. It has eight gates, and contains 50 islands, and 145 bridges, the greatest part built of freestone. The principal church is a superb structure, whose high roof is supported by three rows of columns. There are several large hospitals, and a university, which has generally 200 students, though there are but two colleges; for the scholars board in the town, and have no dress to distinguish them. The school consists of a large pile of brick building, three stories high; in the uppermost of which the famous Elzevir had his printing-office. Adjoining to the school is the physic-garden, where the professor reads lectures in botany. The library contains curious manuscripts; and the theatre of anatomy is one of the finest in Europe. Here are manufactures of the best cloths and stuffs in Holland. Leyden is famous for the long siege it sustained in 1573, against the Spaniards. It is seated near the ancient bed of the Rhine, four miles E. of the German Ocean, and 20 S.W. of Amsterdam. Lon. 4. 33 E. Lat. 51. 10 N.

Leyden phial, in electricity, is a glass phial or jar, coated both within and without with tin foil, or some other conducting substance, that it may be charged, and employed in a variety of useful and entertaining experiments. Or even flat glass, or any other shape, so coated and used, has also received the same denomination. Also a vacuum produced in such a jar, &c. has been named the Leyden vacuum.

The Leyden phial has been so called, because it is said that M. Cunæus, a native of Leyden, first contrived, about the close of the year 1745, to accumulate the electrical power in glass, and use it in this way. But Dr. Priestley asserts that

this discovery was first made by Von Kleist, dean of the cathedral in Camin; who on the 4th of November, 1745, sent an account of it to Dr. Lieberkuhn, at Berlin. See ELECTRICITY.

LEYSERA. In botany, a genus of the polygamia superflua order, in the syngenesia class of plants, and in the natural method ranking under the 49th order, compositæ. The receptacle is naked, the pappus paleaceous; that of the disc plumy; the calyx scarious. There are three species, shrubs of the Cape.

LEYTE, one of the Philippine Islands, about 40 leagues in length, and 95 in circumference. Its soil, on the E. side, is very fertile; but there are high mountains that intersect it nearly in the middle from E. to W, and occasion so great an alteration in the climate, that, when the inhabitants of one part of the island reap, the others sow; and they have two plentiful harvests in the year, to which the rivers descending from the mountains not a little contribute. The island contains 9000 inhabitants, who pay tribute to the Spaniards, in rice, wax, and quilts. Lon. 125, 0 E. Lat. 11. 0 N.

END OF VOL. VI.

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